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EDITORIAL

After five years of war we become increasingly aware of the humble contribution medical students have made towards its successful termination. Those of us who have remained in Canada have however an important task ahead of us, for on us will fall a large share of the responsibility for post-war rehabilitation, and for making Canada the better country our comrades overseas are fighting for. We must begin now to devote our energies to this task; let it not be said that we have failed our country or our countrymen.

With this end in view, we reprint in this issue an article entitled "Two Ways of Life; The Primary Antithesis in Canada's History" by Professor A. R. M. Lower. Professor Lower was for many years Professor of History at the University of Manitoba, and now is the President of United College at that University. He has made many contributions to our knowledge and thought, and the article we reprint was delivered as his inaugural address on becoming President of United College.

"Two Ways of Life" is the most lucid interpretation of Canada's major problem that we have seen. It decidedly must be read by every thinking Canadian, for without national unity we feel that any attempt at satisfactory social and economic reform after this war will be a failure. No progress can be made until our people cease to call themselves English or French, but Canadians. The need for an understanding of this problem is desperately urgent, particularly in the medical profession,

for it is apparent that one of the most important of our post-war plans will be the establishment of some form of National Health Insurance. As medical students we must train ourselves to approach this problem with an open mind, and not be led astray by the twin bogeys of our national life, political and racial prejudice.

We strongly feel that Canada's greatest days lie ahead. Our vast natural resources are largely undeveloped, and our population is far from the optimal level at which a satisfactory national economy can exist. In a sense Canada's fight is just beginning, and we who have been fortunate enough to stay in Canada to complete our education must prove to our countrymen overseas that we have not been dormant whilst they have fought. We must start now both in thought and activity to prepare the way for the great new era to come.

ASHLEY & CRIPPEN

PHOTOGRAPHS

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ERYTHROBLASTOSIS AND THE RH FACTOR

V. J. FREEMAN, B.A., 4T5

Introduction: The subject of Erythroblastosis and its relationship to the Rh factor is receiving an increasing degree of attention in current scientific literature. The fact that most of the research is so recent and the results so revealing is no doubt responsible for much of the interest. The possibility of this research yielding light on the etiology of toxaemias of pregnancy is a factor accountable for some of the importance being attached to Erythroblastosis and the Rh factor. In addition, it should be fully appreciated that this field is not restricted to the haematologist, the serologist and the paediatrician. The obstetrician, the gynaecologist and the general physician are all equally involved in appreciation of the subject. In fact, any medical man who would venture to transfuse a woman assumes an unwarranted risk if he is not wholly aware of the problems involved in this phase of medicine. The following is an attempt to review the rapidly accumulating literature on the subject.

SECTION A

ERYTHROBLASTOSIS FOETALIS

Synonyms: Erythroblastosis Neonatorum; Haemolytic Disease of the Newborn.

Definition: "a form of jaundice of the newborn in which there is a marked increase in nucleated red cells in the blood" (Dorland 1942). An improvement of this definition might be: "a form of foetal or neonatal blood dyscrasia in which there is a marked increase in nucleated red cells in the blood".

History: Late in the 19th century, there were discussed in the literature cases of Erythroblastosis foetalis which had been named improperly as a result of the presence of a very high nucleated cell blood count and the observation of immature white cells in the bloodstream. Ballantyne (a) collected some 70 cases of Hydrops foetalis recorded in the literature. In 1912 Rautman (b) introduced the name Erythroblastosis. The association of Erythroblastosis with Familial icterus was first pointed out by Buchan and Comrie (c) in 1909.

Classification: As a result of careful clinical and pathological investigation the following originally separate disease entities are now generally considered to be different types of the same disease.

1. Hydrops foetalis
2. Icterus gravis neonatorum
3. Anaemia haemolytica neonatorum

These types are classified according to their most characteristic clinical manifestation i.e. universal oedema, jaundice, anaemia. Any one group however, usually manifests one or more characteristics of the other groups, but to a lesser degree.

Javert (1) has added a fourth type to this classification which he calls Haemorrhagic diathesis. This classification includes a group of infants which he describes as "having bleeding from the cord, melena or bloody vomitus, and skin petechiae, in whom careful studies of cord blood, placenta, or autopsy data reveal the presence of erythroblastosis instead of haemorrhagic disease of the newborn".

A fifth type described by Javert as "unclassified" includes certain cases of missed abortions, other forms of intra-uterine death and some cases of stillbirth not classifiable in the above four types.

Incidence: Before the present decade,

a very low incidence of this condition was reported. With the knowledge now available and very much improved methods of diagnosis, the incidence has been greatly altered. However, Javert (1) has shown that the actual incidence does not vary appreciably. During investigations over a five year period, he observed 41 cases of Erythroblastosis out of a total of 17,520 deliveries (1:438) with an occurrence in no year of less than 7 or more than 9 cases. In the three years before this survey, there were reported altogether only 7 cases. Schwartz and Levine (2) in 1943 conclude from tests with Rh antiserum that the incidence is about 1:200.

Of the individual types of Erythroblastosis, the Icterus gravis form is the most common, according to DeLee (3). Hydrops foetalis occurs less frequently and Congenital anaemia is one of the least common forms. Contemporary workers report a similar incidence. However, with the knowledge that some cases of abortion, stillbirth and haemorrhagic disease are directly classifiable under Erythroblastosis, the group incidence may be expected to change, perhaps quite appreciably. Schwartz and Levine demonstrated in an analysis of 24 cases of unexplained intra-uterine deaths that at least 16% and possibly 29% of these were cases of Erythroblastosis.

Racial Incidence: Erythroblastosis has been known for a long time to have a definite familial incidence. This is now explained on the basis of heredity of the Rh factor (see sect. B). Javert (4) suggested the possibility of a high incidence in Irish people. Of interest along such lines of research is the report of Levine and Wong (5) telling how Drs. N. J. Eastman and U. Eno working in China, observed some 17,000 deliveries and failed to discover a single case of Erythroblastosis. Wong could find only one case reported in current Chinese medical literature. If such reports were near the truth, then one would expect that the percentage of Rh negative Chinese would be much lower than that of the whites (14% in whites—Sect. B). Levine and Wong investigated 150 Chinese picked at random in New York City and found only one Rh negative individual, suggesting a percentage of 0.7%. This evidence is further confirmation of the relationship between Rh factor and Erythroblastosis.

Etiology: Although the relationship between Rh antigen and Erythroblastosis is now unquestionable, the exact pathogenesis of Erythroblastosis is as yet unknown. Javert (1) is of the opinion that conclusions concerning the etiology of the disease must be held in abeyance for the present. A discussion of this question is included under section B of this article.

Morbid Anatomy: The findings characteristic of all groups include, according to Javert (4), an invariably hypertrophied heart, enlarged liver and spleen, increased haematopoiesis in liver, spleen, bones and other organs, and amber-coloured fluid in the serous cavities. Microscopically, there are great numbers of haematopoietic areas scattered throughout the parenchyma of the liver, with accompanying necrosis and fatty degeneration of liver cord cells. Haemosiderosis is extensive, the pigment being of two types, one which takes a blue stain, and the other which remains yellow-brown. In addition, the pathology characteristic of each group is apparent i.e. oedema, jaundice and haemorrhage. That haemorrhage is not coincidental in Erythroblastosis, is pointed out by Javert who shows that 29% of his cases had obvious symptoms of bleeding.

whereas the normal incidence of haemorrhagic disease of the newborn is 0.7%.

Javert emphasizes the importance of recognizing the changes in the placenta, especially with regard to diagnosis of a case in which the foetus is macerated. The most marked changes occur in cases of the hydrops type. Here, the placental weight is found usually to be at least double the normal. The maternal surface of the placenta is pale. There is deep fissuring with formation of friable cotyledons and oedema is an obvious feature. The amniotic fluid is amber-coloured. The villi are very large and oedematous and persistence of Langhans cells suggests immaturity. Nucleated red cells are abundant. The foetal vessels are very small or entirely absent. There is great resemblance to the placenta of a syphilitic child.

The placentae of the other types of Erythroblastosis resemble more closely the normal placenta, as far as weight and general appearance are concerned. The presence of erythroblasts and normoblasts in the foetal vessels, in greatly increased numbers, the invariably increased basophilia and the commonly observed syncytial knots are important differentiating and probably diagnostic features.

Javert (4) observed that 21% of his first series of 47 cases showed congenital anomalies. This finding is striking in view of the fact that such an incidence is forty times as great as one would ordinarily expect. The anomalies include such gross lesions as harelip, cleft palate, spina bifida, hydrocoele, etc.

Clinical Picture: The antepartum findings are only now being recognized. Javert (4) includes in his list: multiparity, excessive uterine enlargement, premature labour, yellow-brown amniotic fluid, a previous history of Erythroblastosis and toxaemia.

In his cases of *Hydrops foetalis,* Javert observed a definite tendency to prematurity, with pseudo-hydramnios in 50% and toxaemia of pregnancy in 31%. The hydropic child has a short neck, Mongoloid facies, generalized anaemia and a soft tissue swelling in which pitting oedema is readily elicited. X-ray of the foetus in utero may reveal a Buddha-like or frog-like habitus which Javert attributes to the enlarged abdomen of the child. Occasionally a "halo" shadow is seen between the bony outlines of foetal skull and maternal pelvis which is caused by the tremendous oedema of the scalp of the foetus.

Icterus gravis cases represent a much milder form of the disease. Fortunately this is the commonest form encountered. The child may appear normal at birth, but usually is jaundiced, sometimes quite markedly. There is enlargement of the abdomen as a result of enlarged liver and spleen. Uncommonly there may be oedema in the neck region.

Infants with *Haemorrhagic diathesis* frequently show jaundice as well, in which case they are classified under Icterus gravis. If the only abnormal finding is visceral bleeding or presence of skin petechiae, then they are classified in group four (providing blood studies reveal Erythroblastosis).

Sometimes *Congenital anaemia* is the only finding, and although this feature is common to all groups, if the underlying pathology is that of Erythroblastosis, then these cases are grouped separately (see group 3 of classification).

Blood Findings: Javert (1, 4) has conducted extensive studies on cord blood of affected infants. Some of his results are reproduced below:

	No. of cases	Hg. R.C.C.	Hg. Mgms%	W.C.C.	N.R.C.	C.I.	Pro-throm.
Normal (6)		5.5	18.8	19,200	up to 200	1.1	23%
Hydrops f.	5	1.5	5.5	54,300	43,500	1.3	5%
Icterus g.	6	3.3	13.1	38,400	17,700	1.4	7%
Haemorrhagic d.	4	4.1	16.7	43,200	24,500	1.4	

R.C.C.—red cell count; W.C.C.—white cell count; N.R.C.—nucleated red cells; Hg.—haemoglobin; C.I.—colour index; Prothrom.—Prothrombin.

The white cell count includes many immature white cells usually found in this disease. (The nucleated reds must be excluded by a differential count.) Sanford (6) claims that the nucleated red cell count averages from 50,000 to 500,000 per c.mm. Other blood changes include a hypoproteinaemia and an increased icteric index.

From the above, it is evident that typical cases of Erythroblastosis are characterized by a mild to severe anaemia with color index above normal, a greatly increased count of nucleated red cells, a leukocytosis and a prothrombinaemia and hypoproteinaemia.

Diagnosis: Excluding serological considerations (see Sect. B), the diagnosis of Erythroblastosis in a foetus or newborn infant showing a haemolytic anaemia with resultant hyperhaematopoiesis and erythroblastaemia is best established by blood smear studies. The differential diagnosis is too lengthy to discuss in this article, including as it does such varied conditions as physiologic jaundice, intracranial haemorrhage, haemorrhagic disease of the newborn, congenital syphilis, sepsis neonatorum, acute yellow atrophy, acute haemolytic anaemia, etc. Congenital syphilis may so mimic an hydropic Erythroblastosis, that the Wassermann reaction alone will differentiate the two diseases.

Treatment: At the present time the acknowledged method of treating all those Erythroblastic infants who survive delivery is to *institute immediate blood transfusion.* Javert (4) reports giving as many as nine transfusions (60 ccs. each) in the first few days.

There is some controversy as to the type of blood which should be used. Race and Taylor et al (7) in accordance with many American workers, are of the opinion that an Rh negative blood donor should be used. They base their belief on the assumption that there is an excess of anti-Rh agglutinins in the child's blood even after placental separation, in which case addition of an Rh positive blood would result in destruction of the much needed transfused red cells. Potter et al (8) on the other hand, point out that they have failed to observe the presence of anti-Rh agglutinins in the blood of Erythroblastic infants and can find no record of anyone else being able to do so. Consequently they use Rh positive blood. The question has more than theoretical considerations, for Rh negative blood is almost six times as difficult to obtain as Rh positive (see sect. B).

Vitamin K administration may be of value in cases of Erythroblastosis, although lowered prothrombin levels are probably the result of destroyed liver function. Some cases of Erythroblastosis with direct Van den Berg reactions are reported (4, 6).

Antepartum treatment is largely of a prophylactic nature. If Erythroblastosis is suspected, analgesia and anaesthesia which might affect the infant should be entirely dispensed with. This is important in view of the fact that anaemia,

hydrothorax and ascites already may have started the dreaded process of foetal asphyxiation, as evidenced by the necessity of forceps in 50% of hydropic and 23% of icteric infants in Javert's series (4) because of foetal distress. Caudal anaesthesia might prove to be an invaluable aid in these suspected confinements (see case report below).

The question of premature induction of labour in obvious cases of Erythroblastosis is also a controversial matter. The object of such a procedure is to remove the baby from its pernicious environment as soon as possible. Parsons (9) suggests that premature induction of labour or early Caesarian section might reduce the incidence of kernicterus and cirrhosis in these cases. But Javert (4) points out that premature induction merely decreases the opportunity of delivering a viable baby.

Sequelae: The lesions commonly encountered after infants have had a severe form of Erythroblastosis, especially if treatment has been inadequate, are cirrhosis of the liver, Kernicterus (pigmentation with accompanying degeneration in the subthalamus, the lenticular nuclei, and Ammon's horn of the brain) and mental retardation. DeLee (3) points out the similarity between this combination of lesions and Wilson's progressive lenticular degeneration. Parsons (9) believes that the danger of these sequelae is present in spite of immediate neonatal transfusion. He suggests that if the symptoms of kernicterus (excessive somnolence, convulsions, high pitched cry) are present at birth, treatment should be withheld.

Prognosis: The milder the degree of Erythroblastosis, the better are the prospects for survival. Javert's series of 55 cases (1) is typical:

	No. of cases	Mortality
1. Hydrops foetalis	17	100%
2. Icterus gravis	27	45%
3. Congenital anaemia	4	25%
4. Haemorrhagic diathesis	4	25%
5. Unclassified	3	100%

Schwartz and Levine (2) in an analysis of 2000 deliveries carefully studied 160 cases of stillbirth, neonatal death and certain other foetal deaths. They found 7 cases of established Erythroblastosis and 6 suspected cases giving an incidence of 4.4%-8.2% of practically all foetal deaths.

The prognosis with regard to future pregnancies depends on a number of factors. Important among these is whether the first Erythroblastic case occurs in a primipara. In Javert's series 15% were primiparae and obstetrical histories revealed that the incidence of recurrence was 100%. In the multiparous patients, 53% of subsequent pregnancies (excluding abortions) resulted in cases of Erythroblastosis. Of possible significance in the multiparae is the increase in the relative number of abortions subsequent to a case of Erythroblastosis, the percentage rising from 7.1% to 30% (from Javert's figures). The genotype of the father's blood is also a significant factor in determining the possibility of recurrence of the disease (see Sect. B).

SECTION B

THE RH FACTOR

Discovery of Rh: It is not the intention of the author to review here the blood factors known prior to Rh. Suffice it to say that human red blood cells are known to possess antigenic factors A, B, M and N. The latter two are insignificant, for

they have no spontaneous antibodies and are incapable of causing iso-immunization (immunization in which the antigen and the antibody belong to the same species). A and B are important, for certain human bloods contain their iso-immune bodies α and β, thus rendering blood transfusions dangerous (for further reading, see Gould in *U. of T. Journal* (13)).

In 1940 Landsteiner and Wiener (10) discovered another antigenic property of human red cells. They were working with a rabbit antiserum prepared against the red blood cells of Macacus rhesus monkeys and found that the serum was capable of agglutinating the majority of human red blood cell types after absorption with human bloods containing all known antigenic factors. They called this new antigen the Rh factor.

Incidence of Rh: Levine et al (11) in 1941 reported the results of a survey of over 1000 people selected at random. They found that Rh antigen was present in over 86% of people:

	Rh positive	Rh negative
Males (829)	86.2%	13.8%
Females (206)	88.4%	11.6%

Properties of Rh: Potter et al (8) in comparing the Rh antigen with other antigenic factors in human erythrocytes, point out that Rh resembles M and N in so far as it is present only in the red blood cells and not in other tissues or in secretions and in so far as no spontaneous agglutinins are known to exist in human sera. It differs from M and N and resembles A and B by possessing the ability to produce iso-immunization. The same workers concluded from agglutination tests that Rh antigen is not a single constant entity but a mosaic of antigenic factors.

In the same year (1943) Wiener and Landsteiner (12) suggested the division of Rh into three antigenic subgroups with incidence and reactions according to the following table:

	Antigen types	% of population	Anti-Rh serum	Anti-Rh_1 serum	Anti-Rh′ serum
1.	Rh_1	70%	+	+	+
2.	Rh_2	14%	+	O	+
3.	Rh′	3%	O	+	+

+ = agglutination.

From the above it is evident that one must be cautious in attempting to evaluate the Rh antigenicity of a given individual. If an anti-Rh_1 serum were used, false negatives to the extent of 14% could result, for this antiserum agglutinates only 73% of Rh positive people.

Method of Typing: Levine's method of typing Rh bloods has been adopted widely and is reproduced here because it is a simple procedure which any general practitioner, paediatrician or obstetrician can perform if need be.

Two drops of a reliable anti-Rh serum are added to one drop of 1% red cell suspension in a 7 mm. bore tube. The tubes are shaken and incubated for one hour at 37°C. If no clumping is visible, the tubes are centrifuged for one minute at 600 revolutions per minute. They are then examined macroscopically and if necessary, microscopically. Presence of clumping is evidence of Rh positive cells.

Rh in Pregnancy: The discovery of the association between Rh antigen and Erythroblastosis has been described as among the most brilliant findings of medical

literature in recent years. This discovery followed directly observations on post-partum patients who had suffered severe or fatal reactions following whole blood transfusion. Levine and Stetson (14) published one of the earliest of such reports. The case they cite occurred in 1937 and involved the transfusion of a pre-eclamptic patient with her husband's blood (both belonged to Group O) following delivery of a macerated foetus. A severe reaction resulted. It has since been established that the mother was Rh negative and the husband Rh positive, but without this knowledge the authors, in their 1939 paper, proffered for the first time the suggestion that an inherited factor in the foetus caused the production of antibodies in the maternal blood; the antibodies so produced then reacted with the blood transfused from the father to result in the transfusion reaction.

Burnham (15) in 1941 presented convincing evidence for the existence of a definite relationship between the Rh factor and Erythroblastosis. In one of his cases, anti-Rh agglutinins were demonstrated in the mother's blood, following a near-fatal reaction after transfusion with blood from donors whose cells were established as Rh positive. The baby was a verified case of Erythroblastosis. In another instance, the mother after being delivered of an oedematous stillborn child, died herself when she was transfused with her husband's blood.

In the same year Levine, Katzin, and Burnham (16) published an analysis of twelve cases of pregnancy in which there was a history of toxaemia, macerated foetus, repeated abortion, miscarriage or stillbirth. Atypical agglutinins were demonstrated in the bloods of all of these patients—a very significant observation. The authors recognized a probable connection between the occurrence of complications and the presence of immune agglutinins in the cases analysed and therefore outlined the following theory:

"One may assume that the agglutinins in the mother's circulation under certain conditions are capable of penetrating the placental barrier so that these antibodies, by their continued action on the foetus, induce Erythroblastosis foetalis and its several manifestations".

The concept is not a new one, for Ottenberg (17) in 1923 in discussing the etiology of eclampsia suggested that jaundice of the newborn and certain cases of haemorrhagic disease of the newborn might be due to accidental placental transfusion of incompatible blood.

Levine et al (11) produced statistical evidence in support of their theory. They showed that although a maximum of only 14% of the normal population were Rh negative, over 90% of 111 mothers bearing infants with Erythroblastosis were Rh negative. In addition 100% of the husbands examined were found Rh positive. 58 affected infants were also 100% Rh positive. Atypical agglutinins were demonstrated in 50% of 111 mothers.

Commenting on these revealing figures, Race, Taylor, et al in England (7) state that the discovery "is in itself so overwhelmingly significant statistically, that a connexion between Rh groups and this disease can hardly be doubted, even apart from the evidence provided by the detection of the antibody in many of the cases". The English authors, in a series of their own involving 50 cases of diagnosed Erythroblastosis, found 44 of the mothers to be Rh negative. They demonstrated anti-Rh agglutinins in 38 or almost 90% of these Rh negative mothers.

Potter et al (8) in 1943 reported on a series of 60 cases of babies with Erythro-

blastosis of whom 55 died. 54 of the mothers were found to be Rh negative.

Heredity of the Rh Factor: The Rh factor is inherited as a dominant Mendelian character. Wiener and Landsteiner (12) outlined all of the possible sibling types which can result from the marriage of any two genotypes. According to Javert (1) the genotype incidence in the general population is:

	Incidence	Rh grouping
1. RHRH	37%	positive
2. RHrh	47%	positive
3. rhrh	15%	negative

Genotypes 1 and 3 are described as homozygous positive and negative respectively, and genotype 2 as heterozygous positive.

It is obvious that an Rh negative mother is more likely to be immunized against Rh antigen when each succeeding foetus developing in her womb is Rh positive, than if there were an intervening Rh negative child. A husband whose cells were homozygous positive would provide such an antigenic stimulus. If in an established case of Erythroblastosis the father was identified as heterozygous positive, then the prognosis with regard to future pregnancies would seem brighter.

Race and Taylor (18) recently estimated the genotype incidence in 46 fathers of children who suffered Haemolytic disease of the newborn (Erythroblastosis). They found a marked preponderance of homozygous positive fathers. This is further evidence in support of Levine's theory that the isoimmunization is due to an inherited factor.

An Hr Factor: Most workers have found that 10% of mothers bearing Erythroblastic infants are Rh positive. This discrepancy has been used as an argument against Rh factor causing Erythroblastosis. However, it is readily explained if one acknowledges the fact that another antigenic factor similar to Rh may be responsible for the iso-immunization of the mother's blood. Levine and Javert (see Javert (1)) have studied such a case. The patient was Rh positive and her husband Rh negative. The first pregnancy resulted in a normal child (rh positive). The second child died on the second day with a diagnosis of Erythroblastosis. The third and fourth pregnancies ended as missed abortions. Investigation revealed the presence of an atypical agglutinogen in the husband's blood which the authors have labelled "Hr factor". The mother was found to be Hr negative, as was also the normal child.

A Case History: Although the object of this paper is to present a review of current literature on Erythroblastosis and Rh factor, the student author cannot resist the temptation to include an observation of his own made at the time of writing. The author was completing his six day living-in period at the Burnside Obstetrical wing of the Toronto General Hospital.

The patient, a primipara of 36 years (grava iii), has a history of a miscarriage six years ago, followed four years later by an ectopic pregnancy. These conditions were treated at another hospital where the patient was given transfusions for each. The transfusion six years previously was donated by her husband, that after the ectopic being secured from a blood bank. During her third pregnancy, the patient experienced some bleeding shortly before term. She was admitted to the obstetrical service and after 37 hours of labour a caudal anaesthetic was

started. At delivery it was noticed that the amniotic fluid was a bright yellow and more viscous than normal. The child was covered with a thick, bright, canary yellow vernix, but beneath this coating the skin appeared normal. The baby breathed immediately following delivery and seemed to be in normally good condition. Completion of the third stage revealed a distinctly abnormal placenta. It was discoloured yellow and on the maternal side appeared friable and pink. On palpation, it was pulpy rather than just soft. On the foetal side an old infarct measuring about 5 x 3 cm. was observed. Smears of the cord blood were made.

Examination of the smears was difficult because the author had not previously studied normal cord blood. However, slides for comparison were easily made and the difference found to be striking. The suspected smear contained many times more normoblasts and in addition, a great number of erythroblasts. Nevertheless the baby appeared quite normal, even on the second day. Blood studies were started on the infant in the first 48 hours, but not completed owing to difficulties encountered (the author discovered that babies do not yield blood samples readily). However, the haemoglobin was obtained and found to be at a level of 13.9 Gms. The total nucleated count done in a white cell counting chamber was nearly 80,000 per c.mm. Examination of the blood smear showed a great number of nucleated red cells with a high concentration of erythroblasts. This was compared with a smear made from a normal infant of the same age, the latter showing very few nucleated red cells, all of which were normoblasts.

Blood samples were taken from both mother and baby for Rh determination. The tests were done by the blood bank at the Hospital for Sick Children (Toronto) and reported as mother Rh negative and baby Rh positive. No agglutinins were demonstrated.

The consulting paediatrician found enlargement of the infant's liver and spleen, but apart from a slight conjunctival icterus (which on the fourth day could have been considered as normal), there were no other abnormal clinical findings. The baby was transferred to the Sick Children's Hospital where the author's diagnosis of Erythroblastosis was confirmed.

This case is classifiable under the Anaemia haemolytica neonatorum (Congenital anaemia) grouping of Erythroblastosis. The prognosis in view of the absence of marked symptoms would appear to be good.

Discussion: The question of pathogenesis of Erythroblastosis, on superficial examination, would seem to have been settled by Rh research. The father transmits to the child Rh antigen, which is located in the red blood cells of the foetus. The red cells cross the placental membrane into the maternal circulation where an immunologic reaction results in production of Rh antibodies. The antibodies pass into the foetal circulation, react with the Rh antigen, and thereby cause extensive haemolysis in the foetus. The haematopoietic system is thereby stimulated abnormally—an abnormal response to a normal physiologic reaction—and the bloodstream is filled with immature red cells. The pigment left from the blood destruction accumulates in the reticuloendothelial system producing the picture of hemosiderosis.

Simple as the above theory appears, it is nevertheless incomplete. It does not account for the fact that only a very small

proportion of marriages, in which the wife is Rh negative and the husband Rh positive, produce Erythroblastic children. This discrepancy has been explained by postulating the presence of a break in the placental membrane allowing the passage of the foetal erythrocytes. Then, according to Levine, the placental lesion heals and the Rh antibodies pass through the intact membrane, to the foetal circulation. Against the suggestion that the antibodies pass through the intact placental membrane, Dockeray and Sachs (19) have produced some very interesting evidence. They found Rh antibodies in mothers who were Rh negative, but although the babies were Rh positive, no evidence of Erythroblastosis could be found. One of these mothers was a primigravida. Kracke and Platt report similar findings (20).

If a placental lesion is the factor that allows iso-immunization to occur, it is difficult to explain why in primiparous mothers of Erythroblastic infants, every subsequent placenta should be affected. Also why should the placentae be affected in over 50% of multiparae after their first child with Erythroblastosis? Such definite incidence of recurrence surely is not explained by a chance break in placental continuity.

Javert has re-introduced the idea that eclampsia of the mother may also be due to an interchange of maternal and foetal blood in utero. Dienst's research on this problem reported in Ottenberg's paper (17) is very convincing. In a group of 24 cases where incompatability could arise between mother and child, investigation revealed 15 normal placentae and 9 abnormal. In the group of 15, the mothers had no symptoms of eclampsia, but in the abnormal group, 7 of the 9 had eclampsia and the remaining 2 had albuminuria. Such significant research would bear repeating.

The prognosis for married couples who are Rh disposed is sufficiently good that, if for other reasons their Rh status is revealed, they should not in any way be alarmed. For those who already have had a case of Erythroblastosis, the outlook is different. Depending on whether the mother is a multipara or a primipara and the father a homozygous positive or heterozygous, the prognosis of the pregnancies will range from fair to hopeless.

Those mothers with a record of Erythroblastosis must be cautioned with regard to any future blood transfusion. This point cannot be overemphasized. A good working rule for all medical men would be to avoid transfusing any woman until a proper Rh cross has been performed (incubation at 37°C), for even if she is nulliparous, she may have been sensitized by a previous transfusion (men of course are not immune to Rh sensitization).

Summary

1. Erythroblastosis foetalis is a form of foetal or neonatal blood dyscrasia in which there is a marked increase in nucleated red cells, especially normoblasts and erythroblasts.

2. The disease includes four distinct clinical types: Hydrops foetalis, icterus gravis, Congenital anaemia, Hemorrhagic diathesis, and also certain cases of abortion and stillbirth.

3. Erythroblastosis has an incidence among all deliveries of from 0.25% to 0.5%. Icterus gravis is the commonest type, the Hydrops form being about 2/3 as common, and the others considerably rarer.

4. The disease is believed to be caused as a result of an antigen-antibody reaction. The antigen (Rh), inherited from the

father is found in the foetal erythrocytes, and presumably enters the maternal circulation through a break in the placenta. Antibodies are produced in the mother (Rh negative) which circulate back to the foetus to cause haemolysis with resultant hyperhaematopoiesis, haemosiderosis and liver degeneration.

5. The blood picture in Erythroblastosis is characterized by a mild to severe anaemia with color index above normal, a greatly increased count of nucleated red cells including many erythroblasts, leukocytosis, prothrombinaemia and hypoprotinaemia.

6. Increased normoblasts and erythroblasts in the cord blood is probably diagnostic.

7. Treatment is immediate and thorough blood transfusion. If the diagnosis is made antepartum, avoid analgesia and anaesthesia.

8. Approximately 14% of the general population are Rh negative, but 90% of mothers of Erythroblastic children are Rh negative.

9. Rh antigen is not a single factor, but a mosaic of at least three antigenic principles which have been called Rh_1, Rh_2 and Rh′.

10. The Rh factor is inherited as a dominant Mendelian character. It has been found that a preponderance of homozygous positive fathers occurs among cases of Erythroblastosis.

11. An antigen, similar in action to Rh, and called the Hr factor, has been reported.

12. A case history of Erythroblastosis is cited.

13. Rh factor should be considered seriously in giving *any* blood transfusion, especially to a woman.

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INJURIES OF THE THORAX

J. H. CARSON, 4T5

In this paper an attempt will be made to list the injuries of the thorax. Special attention will be paid to the treatment of the more serious types found under war conditions.

I. Contusion of the Chest Wall

(a) *Bruising of skin and subcutaneous tissue.*

Occasionally an extensive subcutaneous avulsion of the skin and subcutaneous tissues from the underlying fascia and muscles may give rise to a massive hematoma.

(b) *Fractured ribs.*

Ribs may be fractured by either direct or indirect violence. In a fracture which is the result of direct violence the fragments tend to be driven inward into the pleural cavity and may not only rupture the parietal pleura but may also penetrate the visceral pleura and damage the lung. The majority of fractures involve the fifth to ninth ribs.

If a fracture is present deep breathing causes sharp pain in the chest. Antero-posterior compression of the chest causes sharp pain at the site of fracture. A.P. and lateral chest plates usually reveal the fracture. Even if the X-ray picture is negative the patient should be treated for fractured rib if the clinical observations indicate that a fracture is present. The chest should be examined with the stethoscope to determine whether there has been pleural or lung injury.

Complications which may occur are (1) massive collapse of the lung, (2) pneumothorax, (3) interstitial or surgical emphysema, (4) hemothorax, (5) hemorrhage into the lung, (6) empyema, (7) traumatic asphyxia or cyanosis, (8) paralytic ileus.

Fractured ribs almost always heal with a good functional result even though there be gross displacement of the fragments.

In cases of severe injuries of the chest with multiple fractures of the ribs the general condition of the patient should be considered first and surgical shock combatted. Most patients with simple or minor multiple fractures of the ribs do better if the chest is strapped, especially if the fractures are below the fourth rib. The strapping should cover two-thirds of the chest beginning and ending on the sound side. In fractures of the upper ribs vertical strapping over the shoulder and down the back may be of more value. Strapping should not be removed when it becomes loose, but should be reinforced with new tape and maintained for 14 to 18 days. Treatment of the complications will be discussed later.

In some combat areas, in an effort to reduce complications caused by lack of movement of the chest these fractures have been treated by injecting the site of fracture with local anaesthetic. This may or may not have to be repeated depending on the anaesthetic used. Very good results are reported but this method of treatment is not in general use.

(c) *Fractures of the costal cartilages.*

This group also includes chondro-sternal and costo-chondral separation. Symptoms are similar to those of fractured ribs except that the localizing symptoms point to an area occupied by the costal cartilage. The lesion may not be visible by X-ray.

The treatment is attempted reduction

followed by cross-strapping with adhesive.

(d) *Fracture of the sternum.*

This is a rare injury. It may occur either as a result of direct violence or from a hyperflexion such as results in a compression fracture of the spine. When displacement occurs the upper end of the lower fragment usually overrides the lower end of the upper fragment.

Diagnosis is made by swelling, pain and tenderness at the site of fracture accompanied by a positive X-ray plate. This should be taken in the lateral plane to show any displacement as well as the line of fracture.

The treatment is reduction and strapping with the shoulders held well back. The after treatment is the same as that of fractured ribs.

(e) *Extra-thoracic open wounds of the chest.*

They may be associated with fractures of the ribs or sternum and may be associated with wounds elsewhere. A peculiarity of gunshot wounds in this area is that the bullet may strike a rib and follow the paths of the muscle and fascial planes for some distance. Infection may at times be a serious complication.

II. Intra-thoracic injury following non-penetrating Chest Wounds

(a) *Contusion of the pleura.*

This results in pleurisy with a slight effusion. Fracture of a rib may or may not be present. Symptoms are those of any other pleurisy and the treatment is to strap the chest.

(b) *Concussion of the chest.*

This is a rare injury in peace-time and the symptoms vary from slight disturbance of respiration to sudden death. The blow is usually over the precordial area affecting the solar plexus. The mechanism is not clear but a reflex stimulation of the vagus and sympathetic nerves with the toxemia of shock are undoubtedly factors in its causation. It is difficult to distinguish from cerebral concussion and the two may be co-existent. The symptoms are those of severe shock and treatment is supportive.

A type of pulmonary concussion met in war time is that associated with blast injuries. "Lung blast" is produced by the sudden diffuse compression of the lung through the chest and abdominal walls, as a result of the detonation of a high explosive. This hemorrhagic lesion of the lung is usually unaccompanied by any significant injury to the thoracic wall.

The symptoms are usually those of restlessness, dyspnea chest pain, cyanosis, and shock out of proportion to the extent of the injury. There may be blood-tinged sputum or frank hemoptysis. Respiratory excursion is poor. Impairment of the percussion note in one area with distant breath sounds in all fields and accompanying coarse moist rales may be demonstrated. In less severe cases the diagnosis can be substantiated only by the X-ray findings which resemble to some extent patchy pneumonic consolidation. (J. N. O'Reilly, Lancet, '41.)

Zuckerman, Hooker and Marinesco have shown experimentally that the outstanding lesion is hemorrhage into the lungs varying in degree, according to the pressure to which the animals have been exposed.

Again the treatment is that of shock with liberal use of plasma. Morphine should be given with caution in the event that there has been accompanying intracranial damage. Oxygen may be administered when necessary. The sulfonamides

are helpful in the prevention of pneumonia which frequently follows in 24 to 36 hours. The important factor is to appreciate the pulmonary damage and to insist on bed rest for a period of at least 24 hours.

(c) *Contusion of the lung.*

This is a common lesion which may or may not be accompanied by a fractured rib. The essential change is a hemorrhagic infiltration not unlike a red infarct. The area of lung involved may be at the site of injury or contre-coup. Diagnosis is based on haemoptysis, fever, signs of consolidation of the lung, and X-ray evidence. The symptoms at the onset often call for oxygen therapy. Most cases recover.

(d) *Laceration of the lung.*

This condition is frequently, but not always, produced directly by the end of a broken rib. It may be accompanied by hemothorax, hemopneumothorax or a tension pneumothorax. Symptoms may be those of shock or of the accompanying condition. Treatment is conservative and varies with the different conditions as discussed later.

(e) *Traumatic rupture of the lung.*

Resulting from severe trauma this rare condition is seen most often in young people. There may be no external marks or fractures. The pleura is damaged so that air and blood escape into the chest cavity producing traumatic hemopneumothorax. Symptoms are those of this condition and shock. If the mediastinum is torn, mediastinal emphysema rapidly develops. A rapidly spreading infection of serious character ensues if the patient survives the shock and other sequelae. Treatment consists of (1) treatment of shock, (2) artificial pneumothorax to compress and tampon the injured lung, (3) ligation of the pulmonary artery. According to Ritter and Kaye the treatment of mediastinal emphysema is a transverse incision at the base of the neck over the carotid sheath followed by the use of suction drainage.

III. Compression of the Chest

(a) *Traumatic asphyxia.*

This is caused by a violent but temporary compression of the thoracic wall lasting for only a few minutes and associated with severe crushing injuries. Two different clinical pictures may be produced. In the first type the respiration is short, superficial and irregular; the pulse is weak and rapid, there is general body pallor with areas of purple discoloration, the skin is cold and clammy and often the patient is stuporous (Lejars). Often there is no fracture of a rib. The treatment is that of shock including intravenous injections of warm saline, sedation, inhalation of oxygen, and respiratory stimuli.

The second type is rare, is characterized by a diffuse ecchymosis of the face, neck and upper thorax, and is caused only by compression of the chest. The discoloration is due to a sudden marked rise in the intrapleural pressure. Thus all symptoms which follow such as intense cyanosis, protrusion of the eyes, oedema of the eyelids, and subconjunctival haemorrhages are due to the back-pressure effect. The colour later changes to a vivid purple and the line of demarcation shows that the arms and the rest of the body are not involved. The treatment is bed rest and oxygen inhalation. Spontaneous recovery usually occurs in from seven to eighteen days.

(b) *Compression rupture of a large bronchus.*

Rarely severe unilateral compression of the chest suddenly and violently squeezes the mediastinum to the opposite side and effects a rupture of the primary bronchus on the same side as that of the applied force. Death is usually immediate and is due to shock and associated injuries. If death does not occur early there is marked mediastinal emphysema because there is laceration of the junction of the parietal and mediastinal pleura. The symptoms are dyspnoea, cyanosis and collapse. The treatment is suture of the bronchus by open operation and relief of mediastinal emphysema in the manner previously mentioned.

(c) *Traumatic emphysema.*

Surgical emphysema occurs when air escapes from the pleural cavity into the subcutaneous tissues or mediastinum. It is indicative of a laceration of the visceral or parietal pleura or both, and is associated with a variable degree of pneumothorax. It is much more common in penetrating than in non-penetrating wounds.

The subcutaneous type shows crepitation on palpation, and air is demonstrable on X-ray examination. It must be remembered that extensive crepitation may also be produced by a superficial wound in a muscular area if the patient has continued to contract those muscles with the resulting mechanical dispersion of air through the part. The presence of a subcutaneous crepitation about a chest laceration is not therefore necessarily diagnostic of a penetrating wound of the chest. Extensive subcutaneous emphysema is not of serious consequence except for the discomfort and mental anguish to the patient. Most authors advocate no treatment except that of the intrathoracic injury supplemented by the use of codeine for discomfort if necessary. Elkin and Cooper suggest closing the wound carefully and then applying pressure more accurately over the pleural tear which may be some distance from the site of the cutaneous wound. Careful watch should be maintained for the development of a tension pneumothorax which would require the aspiration of air.

Acute mediastinal emphysema probably accompanies all severe intrathoracic injuries (Christopher). It is constantly encountered in operation for carcinoma of the oesophagus. This type may be of serious nature if the tension is sufficiently great to interfere with the cardio-respiratory physiology. The symptoms are usually those of cardio-pulmonary distress, and the diagnosis may be established by the demonstration of crepitation in the suprasternal notch, crepitation on auscultation over the sternum or by the presence of mediastinal emphysema on X-ray examination. Treatment of the primary condition may be sufficient; in some cases Elkin and Cooper advise incision in the suprasternal notch with application of suction through an inverted funnel sealed over the wound.

(d) *Traumatic pneumothorax.*

Following chest trauma, air may accumulate in one or both pleural cavities. The result is partial or complete collapse of the lung on the affected side. The air may enter through an opening in the chest wall (open pneumothorax) or it may enter through a tear in the visceral pleura and alveoli (closed pneumothorax). A penetrating wound that produces a pneumothorax and then becomes sealed off effects a closed pneumothorax and is

so called. In the absence of adhesions the mediastinum is forced over to the opposite side, reducing the vital capacity of the lung on the uninjured side, and producing respiratory and circulatory embarrassment.

Valvular pneumothorax may be either open or closed and is characterized by the fact that the tissues surrounding the injured area act as a one-way valve, permitting air to enter the pleural cavity, but completely or almost completely preventing its escape.

Tension pneumothorax is a form of valvular pneumothorax. In this type the intrapleural pressure is equal to or greater than atmospheric pressure. In some cases when there is an open wound air is sucked into the pleural cavity during inspiration, and in others the air is forced into the pleural cavity during expiration as a result of a reflex closure of the glottis caused by pain. The latter type is accentuated by coughing. The treatment is conservative until the condition causes symptoms and then aspiration with a needle connected with a tube that releases air subaqueously. The hope is that the affected lobe will collapse while unaffected lobes remain expanded and carry on respiration. The Monaldi pump is of use in keeping up a continuous aspiration.

Large external open pneumothorax may result in death due to mediastinal flutter.

(e) *Traumatic hemothorax.*

In 291 cases of penetrating wounds of the chest treated in the Middle East between April '41 and May '43, Scadding and Nicholson found that in 187 or 63% of the cases a hemothorax was present. These were caused both from bleeding of a torn lung and from torn intercostal arteries. Butler maintains that a hemothorax in some degree follows all chest injuries and that it involves the lung parenchyma more often than the vessels of the chest wall. Also he says it may develop many days after the original injury. There is a great deal of controversy concerning the treatment of this condition. Scadding and Nicholson and also Tudor Edwards stress that the sooner aspiration is performed, the less the chance of infection particularly when no foreign body or only a small one is retained. Ritter and Kaye say that aspiration should be avoided for 48 to 72 hours unless cardio-respiratory distress supervenes to lessen the danger of recurrent bleeding. Scadding and Nicholson say that this danger is exaggerated and Zenker states that recurrence of fluid is due to pleural irritation and not recurrent bleeding.

Scadding and Nicholson discourage routine air-replacement following the aspiration of hemothorax. This is sometimes done in an effort to prevent recurrence of hemorrhage but is of little value particularly in the case of bleeding from intercostal vessels.

Air replacement, by causing apical collapse and delaying the expansion of the lungs leaves the whole pleural cavity open to infection with the result that if an empyema forms it is total; whereas if the haemothorax is aspirated early without air replacement the upper lobe will probably expand and become adherent, and if infection occurs a small basal empyema only, is probable.

However air-replacement is sometimes of use in preventing pain or discomfort following aspiration. It was found that manometry was unnecessary in estimating a safe level of pleural pressure since the patient's sensation of commencing tightness was perfectly adequate.

Scadding and Nicholson found that 1/3 of their cases of haemothorax became in-

fected and eventually required drainage. Organisms were most often found at the first aspiration but in a few cases not until later. In a few cases resolution took place with aspiration and chemotherapy but usually suppuration supervened. Aspiration was repeated until the pus became too thick for this to be accomplished easily; then an intercostal drainage tube was inserted with water-sealed drainage. This assured that the drainage remained air-tight till rib resection was necessary.

There is danger in early rib resection in a pyothorax and there is no arbitrary time limit after which open drainage is quite safe. The danger lies in the chance of production of pneumothorax with shift of the mediastinum in cases where safe and adequate adhesions have not formed. Waiting till the pus withdrawn is ⅞ solid on standing is the usual criterion of correct time but in these cases this is uncertain.

Occasionally the hemothorax becomes clotted. This occurred in 6% of the cases of Scadding and Nicholson. The treatment is a posterior thoracotomy and removal of the clot, performed as early as possible.

(f) *Traumatic chylothorax.*

This uncommon condition is the escape of chyle into the chest cavity due to traumatic rupture of the thoracic duct. In 2/3 of cases the condition is found on the right side because the course of the duct is 2/3 on the right side. The tear may be due to direct or indirect violence. The prognosis is poor and death usually results from inanition and exhaustion. The treatment is (1) Surgical repair of the duct and (2) aspiration of the chyle from the chest and its restoration via the intravenous route.

(g) *Traumatic atelectasis.*

According to Lilienthal small areas of atelectasis are found at times some distance from the site of lung injury. The importance of this condition is in its differentiation from traumatic pneumothorax after fracture of ribs. The pain leads to suppression of cough with the accumulation of bronchial secretions. This plugs the bronchus causing atelectasis and urgent dyspnoea. Diagnosis is by X-ray. The treatment is local relief of pain such as the removal of skin suture, a dose of morphine, and persuasion to cough. Untreated, atelectasis with subsequent infection is almost inevitable.

(h) *Massive collapse of the lungs.*

This may involve one lobe or a whole lung and is usually caused by the presence of a plug of mucous in a main broncus. The first treatment is postural drainage. If this is unsuccessful the plug should be removed through a bronchoscope. If infection supervenes a foul-smelling gangrene of the lung is produced and excision is called for.

(i) *Traumatic pneumonia.*

Thoracic injuries are rarely followed directly by an actual pneumonia. Many observers seem to mistake hematomas of the lung for this condition. Secondary pneumonia occurring several days after injury is a serious condition. Nicholson and Scadding record an interesting group of cases in which a pneumonia, usually lobar, developed in the unwounded lung, sometimes after the patient was well on the way to recovery. Lilienthal has also described this condition.

IV. Penetrating Intrathoracic Chest Wounds

(a) *Sucking or traumatopnoic wounds.*

In this condition the tear in the parietal pleura is sufficiently large to allow air to be drawn in and out of the pleural cavity and produce profound shock as a result of the constant variation of intrapleural pres-

sure and oscillation of the mediastinum. The patient is also made prone to sepsis. (Solteau). Laceration of any of the blood vessels that may give rise to a hemothorax may, in conjunction with sucking, cause a fatal haemorrhage. The proper treatment of this condition is a very controversial subject.

The ideal treatment is early and complete excision of the wound and its immediate suture in layers. This is done following evacuation of blood and any easily removed foreign bodies in lung and pleura, and air tight drainage of the pleura for 48 hours through a separate opening in the lower posterior part of the chest. Unfortunately this procedure is rarely possible and temporizing measures have to be adopted. Barrett and other British thoracic surgeons advocate temporary closure by covering the wound with a pad consisting of a piece of mackintosh tissue, to one side of which several layers of vaseline gauze have been sewn. Adhesive strapping is then applied.

Littlejohn, working in Libya advises the use of deep sutures taking in all layers of the chest wall and despite non-excision of ragged or torn wound edges healing is found generally satisfactory. In his view the former method is unsatisfactory as it tends to work loose on movement.

The Russian surgeons, Linberg and Acutin, advocate closure of the muscles and fascia with one layer of cat-gut sutures, avoiding skin suture to prevent surgical emphysema and spread of infection. The superficial portion of the wound may be packed with vaseline gauze.

(b) *Non-sucking penetrating perforating wounds of the chest.*

(1) Hemopneumothorax.

In these cases the wound is not sufficiently open to permit sucking. Hemopneumothorax is present to a varying degree and extent and the symptoms are mainly those of that condition. X-ray examination is necessary for the purposes of diagnosis. In addition to the projectile, particles of clothing, buttons and other extraneous material may be driven into the chest cavity; therefore sepsis is a more important danger than haemorrhage. A stab wound should always be considered potentially infected.

If haemorrhage is proved in these cases operation is usually performed so that if possible the bleeding vessel can be ligated. Gun shot wounds should be treated conservatively. Some surgeons advocate the conservative treatment of stab wounds (Allen) while others prefer extrapleuralization and exteriorization of the pulmonary laceration (Connors and Stenbuck). All penetrating war wounds were considered infected by Gask and he advised complete excision of the contaminated wound before the development of infection as the only certain preventative.

(2) Retained foreign bodies (1).

Most surgeons advocate that large foreign bodies (2 x 1 cm) should be removed; others that they should be left till they cause symptoms. The advisability of their removal depends somewhat upon their position in the chest, that is, whether they are peripheral or central.

Before contemplating removal the surgeon must always ask himself which is the more dangerous, the foreign body or the operation for its removal. Foreign bodies near the periphery least often cause trouble and if abscess or hemoptysis arises later the condition can be treated by an operation no more severe than that required to remove the inoffensive foreign body. Thus a conservative attitude leads to the avoidance of many unnecessary operations.

Central foreign bodies, or those near the mediastinum, are more dangerous. If they are left until complications arise the opera-

tion for their removal is likely to be hazardous; whereas if they are removed early there is but slight chance of empyema developing. Also conservative treatment may result in such conditions as mediastinal abscess, or of ulceration into the oesophagus and great vessels.

In general, therefore, large mediastinal foreign bodies should always be removed. Also large pulmonary foregn bodies should be removed but small ones may be treated conservatively.

(c) *Traumatic diaphragmatic hernia.*

This will be discussed under abdomino-thoracic injuries.

(d) *Traumatic hernia of the lung.*

This is a rare condition in which a portion of the lung protrudes through the chest wall into the subcutaneous tissues. Strangulation may occur. The treatment is operation.

(e) *Penetrating wounds of the heart* (7).

These wounds may be produced by stab or bullet wounds. The symptoms are produced by the accumulation of blood within the pericardial sac and may vary markedly. Collapse, unconsciousness, fecal incontinence, feeble pulse, distended neck veins, profuse perspiration, and low or imperceptible blood pressure are frequent findings. The venous pressure is usually elevated. The most valuable single examination is fluoroscopy of the heart. The absence of visible pulsations is diagnostic. If it is found that the cardiac pulsations are diminishing in volume on repeated examination, the heart should be explored, if other findings are compatible with this diagnosis.

Aspiration of the pericardium should not be done since it is the accumulation of blood which blocks its escape from the heart producing a cardiac tamponade and preventing exsanguination. Through this mechanism the heart is able to continue to function although cardiac output is greatly diminished.

Immediate surgery offers the patient the only chance for survival. After exposure through the sternum the pericardium is opened and the contents evacuated. Silk sutures are placed in the heart wound which may be covered by a finger until the suture can be taken. The pericardium and wound are then closed in layers with black silk.

V. Abdomino-Thoracic Injuries

Either crushing or penetrating wounds of the chest may cause perforating wounds of the diaphragm. Wounds of the central tendinous portion are more dangerous than peripheral wounds (4).

In penetrating wounds of the lower chest the first task is to decide whether or not the injury involves the peritoneal cavity. The rigidity of the purely thoracic injury is more obviously unilateral, less definite on inspiration and unaccompanied by vomiting. The patient with an abdomino-thoracic wound presents a picture of shock and respiratory distress; the man with the thoracic wound may have more distress but very seldom so much shock. This may be misleading in the presence of a large intra-thoracic hemorrhage. In doubtful cases rigidity is the key to the diagnosis and the effect of aspiration of fluid from the chest on the rigidity may well be decisive.

The treatment differs for abdomino-thoracic injuries on the right and left sides. Right sided wounds often involve the liver only and laparotomy is not required. It suffices to close the chest wound from above, remove any foreign body felt through the hole in the diaphragm and treat the haemopneumothorax in the ordinary way afterwards. Where, however, injury to other abdominal viscera than the liver is suspected, laparotomy

should be done. The defect in the diaphragm is not serious since the liver prevents the development of a diaphragmatic hernia.

On the left side diaphragmatic hernia is a real danger and also the spleen may be injured. In the experience of Blackburn splenectomy has to be done quite often in these cases and carries a mortality of 50%.

Gordon-Taylor summarized the present day treatment of abdomino-thoracic wounds as follows: "Through and through abdomino-thoracic wounds of the right side require no active surgical treatment provided there is no extensive involvement of the thoracic or abdominal wall or peritoneal cavity. Accessible fragments lodged in the lung should be removed.

"In open pneumothorax the chest assumes chronological priority of treatment.

"If the position of the wound of entry and exit in an abdomino-thoracic wound involves the left subphrenic area of the abdomen, the thorax should be dealt with first and access to the upper abdomen obtained through the diaphragm.

"When the thoracic injury appears insignificant but there is evidence of intraperitoneal damage the abdomen is explored through a laparotomy incision.

"When the thoracic injury is slight and a through and through wound suggests an extraperitoneal course of a small fragment, such injury may be left alone.

"If an abdomino-thoracic injury has been approached from the abdominal aspect, it is important not to waste time trying to complete a difficult suture of the diaphragm in a critically ill patient unless the aperture in the midriff is so large that immediate or early herniation of the abdominal contents is certain to occur."

VI. Chemotherapy

(a) *Army* (1).

Sulphanilamide is given by mouth as a routine. During evacuation it is impossible to ensure that four hourly doses are given; therefore, now, along the line of evacuation a dose of 2.5 Gm. is given every 12 hours, and all patients in a convoy receive this dose at the same time. This method has effected a great improvement in the adequacy of chemotherapy before hospital admission.

(b) *Navy* (6).

Routine sulphathiazole is given to all chest injuries: 1 Gm. q. 4 h. x 6 for 3 days, 1 Gm. q. 4 h. x 4 for an additional four to seven days. If the factor of infection is considered minimal the drug is then discontinued.

There have been no untoward reactions and a highly satisfactory effect has been exerted in the control of pleural and pleural-pulmonary infections.

VII. Summary and Conclusions

In this paper have been listed the different types of chest injuries with an outline of etiology, diagnosis and treatment. Particular attention has been paid to wounds found under war conditions.

It may be said that the principal considerations in the treatment of all chest injuries are: (a) the restoration of normal cardio-respiratory physiology, (b) the treatment of shock, and (c) the treatment of any complications or sequelae which may arise.

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SHOCK THERAPY IN PSYCHIATRY
Part II

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Part II of this paper will include

(1) Results of Shock Therapy.
(2) Theories concerning Mechanism of Improvement.

Results of Shock Therapy

Shock Therapy is used in the treatment of schizophrenia, involutional melancholia, manic depressive psychoses and psychoneuroses.

In considering the value of shock therapy, as in any therapeutic procedure, two major questions need answering. The first is, are these methods of enough benefit to the patient to justify their use, and the second, how much permanent damage is done to the patient.

Are these methods of enough benefit to the patient to justify their use?

In the study of the practical value of shock treatment, statistics are helpful, but only to a limited degree. This becomes obvious when one compares the wide divergence in results reported by different investigators. Firstly, the number of cases reported varies from 1 to as many as 1039 per paper. Secondly, recovery rates vary from 92% to 7% with some papers quoting even poorer results than in untreated cases. This great variability in results may be due to:

(a) Differences in diagnosis,
(b) Differences in technique,
(c) Different types of patient material,
(d) Differences in evaluation of results obtained.

To rule out differences in evaluation of results obtained, it has been suggested that patients be classified in the following categories, according to the amount of improvement which has occurred:

(A) To be classified as "recovered," the patient must have become entirely symptom-free and must have developed insight regarding his illness. Insight means that the patient must fully realize that he has suffered a mental illness, and that his symptoms were in fact, a part of this illness. He must also be able and willing to speak of his illness in detail and objectively and with normal affect and he must be able to adjust well in the community at his prepsychotic level.

(B) The term "much improved" means that the patient is entirely symptom-free but that insight as defined above is incomplete or lacking, although he may adjust well at or near his prepsychotic level.

(C) The patient is considered "improved" if his symptoms are incompletely alleviated but less distressing so that he is able to make a definitely better adjustment than before treatment.

(D) The term "unimproved" is applied to those patients who derive no benefit from treatment.

In considering the differences in types of patient material and its bearing on the results of therapy, it is a well known fact that some patients respond to shock therapy better than others. In general most workers agree that the following factors are necessary for the most satisfactory results from shock therapy:

1. An illness of acute onset and short duration, preferably under 6 months and not longer than 1 year. (This is very important.)

2. The presence of affective factors in the psychosis.

3. An adequate prepsychotic personality, and

4. The presence of exogenous as opposed to endogenous precipitating factors—in short, those factors which make for a good prognosis generally.

In considering the effect of differences in technique, best results are obtained when intensive psycho-therapy is used in conjunction with shock treatment.

Keeping in mind the limited value of statistics, let us now consider each of the methods of shock therapy in turn.

1. *Insulin Shock Therapy*

Although insulin is being used occasionally in the treatment of manic depressive and involutional psychoses as well as psychoneuroses, its main use is in the treatment of schizophrenia.

It is an established fact that insulin is capable of modifying the clinical picture of schizophrenic syndromes to any extent, even up to the complete abolition of all schizophrenic symptoms. However, it is known that improvement and recovery frequently occur in schizophrenic patients without insulin therapy. The problems then arising are, whether improvement and recovery occur more frequently in schizophrenic patients with or without insulin, that is, whether insulin therapy merely hastens a process of improvement, which would otherwise have occurred without this form of treatment.

In attempting to find an answer to these problems, one must look at both the immediate and follow up results of insulin therapy. In one large series of cases reported the number of recovered cases as well as the total number showing some improvement after insulin therapy was three times that in a control group receiving the usual institution treatments. Most workers agree that the immediate results of insulin therapy contrast very favourably with those obtained through other methods.

When one follows the patients who have received insulin therapy over a period of several years, it is found that relapses are frequent and the percentage of cases which show a favourable outcome decreases. Some workers believe that these long term results approximate those in patients treated by other means, but most observers consider these results to be slightly or much better than results obtained without hypoglycaemic therapy.

From a consideration of these results, it appears that insulin is not specific for schizophrenia and does not alter the basic schizophrenic pattern. However, it does appear that one can do more for schizophrenics with insulin than is possible without it. Time alone will tell whether this treatment ever becomes established.

2. *Metrazol Convulsive Therapy*

Metrazol convulsive therapy was originally proposed as a therapy for schizophrenia, but during the years following its institution, it became increasingly evident that the main field of its effectiveness was not schizophrenia, but the affective disorders. The results in schizophrenia show an obvious statistical discrepancy. Some authors report an 80% remission in schizophrenic patients with an illness of less than 6 months duration, while others concluded that results in schizophrenics were poorer after metrazol treatment than with routine hospital care. Insulin shock treatment continues to be the method of choice in schizophrenic reactions. This does not mean that metrazol has been entirely abandoned in schizophrenics, for it is still utilized in cases of catatonic stupor and appears also to be

of value for schizophrenics with depressive features. In these patients it frequently terminates these states and their nutritional and nursing difficulties. Even if the patient can't be discharged he can often make a better hospital adjustment.

The results in depressive psychoses are often striking, especially in involutional melancholia and the agitated depressions of later life. However, depressive states are prognostically favourable and in general self-limited. Therefore one should carefully consider whether the possibility of shortening the illness outweighs the treatment risk in each individual case. Most workers use convulsive therapy only if the depression lasts longer than is expected, if the patient becomes exhausted from excitement and agitation, if repeated suicidal attempts endanger the patient's life or if his suffering appears unbearable.

3. *Electric Convulsive Therapy*

By evaluating fairly comparable groups treated by electric shock and metrazol, it appears that the therapeutic effects of both methods are essentially the same. Therefore the main indications for electric shock are the same as for metrazol, that is, the affective disorders. However, electric shock therapy has certain advantages over metrazol.

1. There is an immediate loss of consciousness associated with the painless electric shock and complete amnesia for the whole treatment, whereas there are many subjectively disagreeable elements in the pharmacologically produced convulsion.

2. There is a lack of discomfort following the treatment in electric shock, which is not so in metrazol.

3. It removes the inconvenience of frequent intravenous injections.

In consideration of these advantages, it would seem warranted at the present time to discontinue metrazol treatments in favour of electric shock convulsive therapy, providing convulsive therapy is to be given.

We come now to the second question that requires answering:

How much permanent damage is done to the patient?

The mortality rate for shock therapy is 0.5%.

There is a difference of opinion as to whether lasting brain damage results from shock treatment. Memory changes commonly follow convulsive therapy but they are only of some weeks duration. Changes in the electroencephalogram and rare evidences of damage to the motor pathways are other signs to be drawn from human material. Animal experiments demonstrate that cerebral damage and vascular injury occasionally result. On the other hand, permanent clinically recognizable defects are of great rarity and the changes in the electroencephalogram are usually transient.

Therefore, the possibility of permanent brain damage persists. However, no clinical signs of a lasting mental defect due to these methods have been reported. In view of the gravity of the psychoses treated with these methods, it would appear that despite the possible occurrence of damage not clinically detectable, the risk involved should not necessarily be regarded as prohibitive if there is a chance of improvement.

Theories Concerning Mechanism of Improvement

Various theories, none of them convincing, have been offered as to why shock therapy is effective. Sakel, the originator of insulin therapy, has an interesting

hypothesis which in simplified form is as follows:

The various reflexes during hypoglycemia disappear in the order of their evolutionary development and they reappear in reverse order. The first organic functions to be eliminated are those which are phylogenetically and ontogenetically most recent. The cremasteric reflex for example disappears first, while the corneal reflex which is more ancient remains active longer. When hypoglycaemia is terminated and normal relations are again revived, the first centres to respond are again the older and more resistant ones, for example respiration and temperature; the corneal reflex is the first to return, the cremasteric last.

In mental processes too, those components of the mind which happen to be most dominant and active are most quickly and effectively eliminated. The hypoglycaemic state first eliminates and inhibits that portion of consciousness in a psychotic subject which happens to be most active at the time, with the result that the other portions again rise to the surface to achieve dominance, even if only for a short time. In cases which progress favourably, repeated and correctly managed hypoglycaemic states finally serve to produce a permanent dominance of those psychic elements which hitherto have been repressed.

Attempts have been made to explain the results of hypoglycaemic and convulsive therapy on a common basis. Four main theories have been propounded. These may be called:

(1) The physiological theory,
(2) The organic theory,
(3) The psychological theory, and
(4) The psychiatrical theory.

1. *The Physiological Theory*

Many workers believe that the efficacy of shock therapy is due to the modification of brain metabolism. They believe that the major effects of both hypoglycaemic and convulsive therapy is a reduction in the oxygen consumption of the central and autonomic nervous systems. In support of this are the experiments which demonstrate that there is a decreased arteriovenous oxygen difference to the brain in patients receiving shock therapy. Attempts to duplicate the therapeutic results of shock therapy by exposure to low oxygen tensions have produced conflicting results. Some observers report an improvement in the psychotic state while others report no change.

2. *The Organic Theory*

It may be that some organic change in the brain determines the therapeutic effect of the treatment. The question of brain damage was discussed earlier in the paper.

3. *The Psychological Theory*

From the psychological standpoint improvement may be considered as being due to the patient's experience of the treatment as a punishment or as a threat to his existence.

4. *The Psychiatrical Theory*

Some believe that shock therapy changes the organism in such a way that the patient becomes able to turn his affection and interest to persons and objects of the outside world. Whether this altered attitude is merely temporary or becomes permanent depends greatly upon his capacity to endure reality with its alluring and threatening qualities.

Conclusions

1. Attempts to draw conclusions concerning the results of shock therapy from a study of statistics leads to very conflicting results. Shock therapy is most effective in those patients who have a good prognosis when treated by other methods.

The importance of psychotherapy as an adjunct to shock treatment is emphasized.

2. Hypoglycaemic therapy is more effective in the treatment of schizophrenia than other methods at our disposal.

3. Convulsive therapy is mainly effective in affective disorders, where it often yields striking results. Electric shock therapy is as effective therapeutically as metrazol and has in addition certain advantages. Because of this it seems justified to discontinue metrazol treatments in favour of electric shock therapy.

4. The mortality of shock therapy is 0.5% The risks involved in shock therapy should not be considered as prohibitive to the use of these treatments.

5. Many theories have been advanced to try to explain the modus operandi of shock therapy, but none of them are convincing. The basis of this form of therapy still remains empirical.

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TWO WAYS OF LIFE: THE PRIMARY ANTITHESIS OF CANADIAN HISTORY*

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THE school-boy, with unerring judgment, picks out as the dullest subject of his acquaintance, Canadian History. Given the way it is usually presented to him, the school-boy is right. But need he be? Does his judgment arise from the intrinsic nature of the material? I do not think so. On the contrary, the historian of Canada has at his command exciting and diversified resources, if he have but the skill to make them diversified and exciting.

Foremost among them, surely, are the glaring contrasts upon which this country rests, its sharp antagonisms, the diversity of the groups within it, its unbelievable geography, the ringing clashes everywhere upon all the great fundamentals. The human scene in Canada, both in time and space, is as full of bold colours as a typical Canadian landscape. The painter has used these effects: if the historian cannot, but puts everything into dull grey, it is his fault if people pass him by.

Of all our clashes, who will deny that the deep division between French and English is the greatest, the most arresting, the most difficult? Here is the most resounding note in our history, the juxtaposition of two civilizations, two philosophies, two contradictory views of the fundamental nature of man. For the historian, to neglect it is to leave the battle line. I propose therefore to devote this paper, with what skill I can command, to a short exploration of this primary antithesis of Canadian history. Since it is nothing less than two historic ways of life that I am going to look at, it is especially necessary to keep in mind the warning against "the dilettante who believes in the unity of the group mind and the possibility of reducing it to a single formula."[1] Whatever I have to say will, I hope, be taken by members of both races in the same spirit in which it is uttered, with a wish to understand but no desire to wound. While I shall be as objective as I can, I am well aware that to one of the divergent groups I myself belong.

* * *

A paper of this sort, attempting to look at a few of the fundamentals upon which this country is built, with a view to securing some of that release of tension so necessary to our national well-being, should logically begin with medieval Catholicism and St. Thomas Aquinas, for no one who wishes to understand Canada will get very far until he has studied the medieval structure which a section of this country preserves with singular integrity. Failing the possibility of so comprehensive an approach, the movement which stands at the threshold of our present era, the Reformation, may serve as a point of departure. To that revolt against ecclesiastical metropolitanism, the medieval church, which had been rapidly disintegrating in the liberal world of the Renaissance, owed the renewal of vitality that expressed itself in the Counter or Catholic Reformation. In France, the first of our mother countries, the historical process was delayed for three-quarters of a century by civil strife. This gave to the religious problem a solution not in terms of compromise, as in England, but in those of the new Catholicism. The French Reformation, when in the first quarter of the seventeenth century it at last began to formulate itself, soon showed that it was not merely an imitation of that of Spain or Italy. It was French and northern. It was not particularly intellectual or artistic—no earnest religious movement can be—it had little either of the subtlety or the cruelty of the true Latins beyond the mountains. It was enthusiastic, serious, moral, evangelical. There was about it none of the fireside comfort of Anglicanism, little of the cold selfish-

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[1]Max Weber, quoted in Tawney, *Religion and the Rise of Capitalism* (Pelican edition), 256, note 7.

ness of Calvinism. It was a warm, human faith, full of visions and harmless miracles, strict in the standards of conduct it enjoined on its adherents. For those whose roots lie in nineteenth-century Protestantism, it diffused a religious atmosphere which, save for its ritualistic and sacramental basis, is not difficult to understand: it was a kind of nineteenth-century Methodism in a seventeenth-century Catholic setting. It was above all things missionary, and the missionaries it was to give the New World, the Brébeufs and Lalemants, were to become in the manner of their deaths, strong pillars of France in America. Their shadows have loomed the larger as they have receded and today the proud memory of the martyrs gives to French-speaking Canadians a centre of loyalties and a support which their English-speaking fellow countrymen have nothing to match.

It was in the man who was to be the first bishop of Quebec and in the nature of the church he established that the French Catholic Reformation was most deeply to affect Canada. François de Laval was strong-willed, haughty, eager for power, a puritan in morals, ultramontane—as was perhaps natural in a man whose younger days were passed among the confusions of the Fronde, with its tarnishing of royal power—jealous of the privileges of the church as opposed to the state, jealous of his rights as bishop, jealous of his personal dignity in the presence of the Governor. Such traits have many times been repeated among his successors.

The ecclesiastical system whose foundations he laid was never to falter in proper loyalty to the King but within the orbit of that loyalty was to become as strong as the state itself. Education was in its hands from the first—as was inevitable in a period where education was universally a department of religion. The priesthood under him was formed into a disciplined body of men who were not allowed to become incumbents of "livings," but remained missionaries—fighting troops to be moved about from station to station at the discretion of their commander. The system still holds. The instrument Laval fashioned has proved its strength and its worth.

After Laval's time, Canadian-born became more and more common among the priesthood. This had its advantages and disadvantages. The Canadian priests were at one with their people: they were the natural shepherds of their flocks. On the other hand, they were provincials, with little experience except in their own small world. Their culture contrasted unfavourably with that of highly trained Jesuits and Sulpicians from France, but this lag in culture in the period following the original immigration is a familiar story in all new countries, a stage that must be worked through as a new society forms itself. It was as nothing compared with the asset of the curé's closeness to his people. When the evil days came, he had been fitted to become their natural leader, their salvation in tribulation. He retains his place to this day. A moment's glance at history should be sufficient to take all meaning out of that charge so often levelled by bigoted people that the French Canadians are "priest ridden."[2]

Laval built on natural foundations, for Catholicism of this popular, even democratic, northern type reflected the genius of the French people who came to Canada, the peasantry of Normandy and its neighbourhood, just as its close relation, Anglicanism, has suited the neighbouring peasantry of southern England, and as paternalistic and sacramental religions suit any peasantry. The life of the peasant is a series of ritual occasions—planting and harvesting, being born, coming of age, begetting, dying. The land has always been there and it always will be. Man's occupancy is transient and the individual is only one in a long chain from forefathers to descendants. All are one family, interrelated if not in this generation, in the last or the next. All give unquestioned obedience to the great mother goddess, the earth-mother, who can easily be made to wear a Christian dress. The restless strivings, the desire for change, "improvement," "progress," "opportunity," which we today take as the normal condition of life, are absent. Man is subject

[2]It is well known that after the conquest, the habitants were very glad to escape from the obligation of the tithe, but that indicates no general dislike of the clergy, simply a healthy independence, which has been demonstrated on more than one subsequent occasion, as, for example, in the elections of 1896.

to nature and to nature's moods: he learns to acquiesce in the drought and the flood, the good years and the bad. As his animals and plants grow and come to harvest, so he grows and comes to harvest. His religion is among the simplest and oldest of all creeds, Catholic almost by accident.

The business of the peasant—or *habitant,* as he became in Canadian parlance—was not to make progress but to "make land": to "make land" many hands were necessary. Nature responded, as she always does. Practically all pioneer peoples are prolific, the transplanted French were especially so. There was lack neither of food nor function for every new child. A socially minded people saw no evil in being surrounded with their own and in the swift, steady widening of the family connection. Quite the reverse. They found happiness in life, not in things. A new and finer house meant less to them than sons and daughters growing up in the neighbourhood. If some died, others came: they would all meet hereafter. If some were lame or halt or blind, that was God's will. It was life that He and nature commanded, not the saving of life. This other-worldliness, still so marked in the countryside of Quebec, and not at all divorced from practical wisdom, was re-inforced by the immemorial teaching of the church: man's real life begins hereafter. A genuine belief in immortality works profound effects on the manner in which a people lives. Catholicism and the countryside, simple French peasant traditions, as old as agriculture, and the French joy in human companionship, came together into a strong complex which to this day shows little sign of giving way.

Yet for decades the countryside of New France was a neglected plant, overshadowed by the adventurous foliage of fur trader and missionary. Old France had men for high tasks but not peasants for export. Nor did the home-loving peasantry of a non-emigrating race wish to leave their native soil. The English separate themselves from home and family with ease—and often with relief: they dislike the cramping atmosphere of small communities. The French cling to the ties of mutual support: they dislike going away from the near and the familiar. They accept and enjoy the life of small communities. It is not surprising that only a few of them came to the new province, less than ten thousand, it is said, but all of them firm in their Catholicism and carefully guarded from taint or touch of heresy! From these all persons of French-Canadian race are descended. The combination of a faith kept free from all possibility of contamination, of a close environment, the banks of the St. Lawrence, and this extraordinary degree of inbreeding, produced a stock whose homogeneity surely can have few parallels. For the rest of us, with our multitudinous descents, this close-knit world is almost impossible of entry. All its members have clouds of common ancestors, all have had identical historical experiences and all hold the same creed. Even today, amid the complexities of the modern world, the degree of differentiation seems relatively slight. All French Canadians are, as it were, the same French Canadian.

The process of forming a new people began as soon as the first children were born. By the Conquest, it was for practical purposes, complete. The seventy thousand Canadians of 1760, in a century of wrestling with the wilderness, had created a new society: one resembling the old peasant societies of France but with its own orientation, especially with its own family clans and its own passionate love of the land it had made its own and the soil it had won from the wilderness and the natives; a society entirely cut off from the rest of the world, turned inward upon itself to a degree few people of English speech can grasp; a society unbelievably parochial but in every sense a strong blood brotherhood. This was the little world that was to crash under the triumph of English arms. The heart of the French nation had never been in empire and it saw the vision of Champlain fade without regret. But what of the children of France, the Canadians, those who had taken such firm root in the soil that was to pass under the alien flag? What of them, isolated now in the hostile, Protestant, English continent of the conqueror?

It is hard for people of English speech to enter imaginatively into the feelings of those who must pass under the yoke of conquest, for, except in the Southern States, there

is scarcely a memory of it in all their tradition.[3] Conquest is a type of slavery and of that too we have no memory—except as masters. Conquest, like slavery, probably must be experienced to be understood. But one can intellectually perceive what it means. The whole life structure of the conquered is laid open to their masters. They become second-rate people. Wherever they turn, something meets their eyes to symbolize their subjection: it need not be the foreign military in force, it need not be the sight of the foreign flag, it may be some small matter—a common utensil of unaccustomed size and shape, let us say, taking the place of one familiar. And then there is the alien speech, perhaps not heard very often, but sometimes heard, and sometimes heard arrogantly, from the lips of persons who leave no doubt that the conquered are in their estimation inferior beings. Even the kindness of the superior hurts.

Nor does conquest sit easiest on the humble. The educated may make their peace, learn the foreign language, and find many areas in common, but the humble cannot cross the gulf—they feel pushed aside in their own homes. Hence it is that nationalism will always live longest, even if not blazing up into fierce flame, in the hearts of the people, who will seek to maintain their own ways by the passiveness of their behaviour, and little by little, as opportunity offers, will edge forward into any chance space left vacant by their masters.

Conquest in the forces it sets in motion may be tantamount to a revolution. The conquered are so bludgeoned by fate that they come to find new spiritual springs of life. Something like this did happen in French Canada. French Canadians are strong as a group today not least because they passed through the valley of the shadow a century and three-quarters ago.

No one can suggest that the English conquest was cruel, as conquests go, or the English government harsh. If the French in Canada had had a choice of conquerors they could not have selected more happily. But conquerors are conquerors: they may make themselves hated or they may make themselves tolerated. They cannot, unless they abandon their own way of life and quickly assimilate themselves, in which case they cease to be conquerors, make themselves loved. As long as the French are French and the English English, the memory of the Conquest and its effects, will remain. Not until the great day comes when each, abandoning their respective colonialisms, shall have lost themselves in a common Canadianism, will it be obliterated.

Within the old régime the French-Canadian type was formed: all its history since has been merely a superstructure on the foundation then laid. Anyone understanding the conquered people and gifted with a sufficiently prophetic eye could in 1760 have foretold the attitude of the French Canadians toward conscription in 1941, or for that matter in 2041. In external affairs, including war, it is, was and will be, simply that of most of the other small Latin and Catholic peoples of the hemisphere who have been cut off from their parent stock and find themselves in a world that has moved far away from the pole about which they swing, they whose metropolitan centre is not London, or Moscow, or New York, but Rome. If we can understand the reactions of Ecuador or Paraguay to this northern world of Anglo-Saxons, Slavs, and Germans in which we live, we shall understand that of Quebec readily enough.

In the 180 years since the Conquest, new phases of the basic situation have naturally presented themselves. As numbers and wealth increased and as English parliamentary institutions were introduced, a new class grew up—the intellectuals who spilled over from the too abundant material for the priesthood into the secular professions, especially the law. In French Canada, where everyone likes to talk and to hear good talk, the lawyer, *l'avocat*, has had a field day. His opponent invariably being another lawyer, every election has turned itself into an oratorical contest and since a superbly convenient

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[3]Yet as late as the nineteenth century an historian like Freeman could draw a line between the Saxon people, with whom he identified himself, and their conquerors, the Normans. In his writings the Saxons were always "we," and the Normans "they." The memory of conquest dies hard!

whipping boy has always stood ready to hand, it has been inevitable that every contest should involve him—*les sacrés Anglais*, the damned English. Is it therefore too much to suggest that every political fight from 1791 to the present day has had as its fundamental, if unexpressed issue, the English conquest? If the situation were reversed, the same would be true of us—as it is to some degree true in the Southern States. But why does the point need labouring? Does not the municipal government of the capital of our largest and wealthiest province turn on an even more ancient issue than the Plains of Abraham—on that obscure Irish skirmish, the Battle of the Boyne?

The French-Canadian intellectual, whether lawyer, journalist, or priest, has run true to type. He has lived in a world of ideas—or notions—but he has been better at talking, perhaps, than doing. He has had a difficult road, because for him there cannot be that free play of the intellect so naturally assumed by his opposite numbers in the English camp. His education has formed his mind before the world has opened to him and he has had to do his thinking within a system whose boundaries are rigid. The results have been the weak development of the objective studies, the slam-banging personal tone of French-Canadian journalism (which is also agreeable to the spirit of the French race), its sometimes rather tenuous connection with facts, but above all the shoving-over of discussion and emotion to another concept, that of the race. The intellectual, priest or layman, has been the protagonist of the race. It is a natural, if somewhat unhealthy role. Any virile group cut off from free expansion will necessarily turn inward and console itself with its own virtues. It will at all costs seek survival and an opportunity to break its bonds. This is the motive power behind Nazi-ism, Fascism, and "Japanese-ism": Germans, Italians, Japanese, all suffer from a species of claustrophobia. So do many French Canadians, marooned in an English continent. Like causes produce like results. The utterances of extreme racialists everywhere, whether in Germany or in Canada, come back to about the same thing. But it has been our good luck, here in Canada so far, that the extremists of neither race have captured control of the state.

Nevertheless as the outside world has pressed more and more on the French island in America,[4] racialism has become more and more self-conscious and has absorbed into its concepts more and more of life, so that today it is impossible to tell whether the race is the bulwark for the faith or the faith for the race. Possibly the latter. It would appear to the outsider as if the French church today could to some extent stand apart from its own spiritual significance as a manifestation of Christianity and find its function in binding together people of common blood and speech.

We English Canadians have not until recently been very much plagued by intellectuals. Most of them who have not been drained off into practical tasks, we have managed to ship to the United States. The French have not had that easy solution. Their society was completed long ago and there has not been a great deal for the intellectual to do except watch the English men of business tear it to pieces. The French intellectuals cannot enter into that world, any more than can our own. They can merely stand at the threshold, their sensitive souls lashed with the thought that they may be regarded by the bustling representatives of the conquering race as second-class citizens. Hence their discontent. Hence much of the explanation for the Papineaus, the Bourassas, the Chaloults, with the rather pathetic cry, repeated from generation to generation, for more "posts," more safe government jobs, free from the rude blasts of English initiative.[5]

But French Canada, even if its people so desired, has not remained frozen in Maria Chapedelaine-ish postures. Things do move. The most conspicuous change is the com-

[4]And how heavily it does press! Note how American persuasiveness has at last drawn the "Quints" out of their backwoods French environment and put them on a public platform singing English songs! The reference is to their appearance at Superior, Wisconsin, during May, 1943, to sponsor certain ship launchings.

[5]It is in the 92 Resolutions of 1834 and in one of Mr. Chaloult's speeches of May, 1943.

ing of industrialism and the swing from rural to urban.[6] In 1871, 80 per cent of the French people of Quebec were rural, today only 42 per cent are. One of the most interesting questions that confronts the social scientist is what urbanism and industrialism will do to the Canadians of French speech. Will this unique peasant structure, this strong fortress of the Catholic Reformation be able to adapt itself to the new kind of life? French Canada today is in the grips of the first revolution its people have ever known, the Conquest excepted, the industrial revolution. What will be the outcome of the clash of medievalism and modernism, of the régime of the natural law and the acquisitive ethic? Will Catholicism adapt itself? Can the countryside continue to send out its sons and daughters in such a strong tide that peasant values, the faith and the church, will continue to dominate the cities? Will the race as binding concept more and more displace the faith under the dissolving forces of urbanism? Will urban values work back into the countryside and give to rural Quebec, as they have already given to rural Ontario, a kind of suburban atmosphere? Will the forces of continentalism triumph over this strong fortress of localism? Will the international unions displace the Catholic? Whatever the future holds, the appointed guardians of race and faith will put up a good struggle.[7] The rural clergy will not be tempted overly much by the English shibboleth of a "high standard of living": they see the trap that lurks in that. They will not be too much in favour of high wages and only mildly of progressive and social measures, for their people have not yet reached the stage where they feel it necessary to be parsimonious of life. Heaven may not be quite as close as it once was and temporal values may be getting more emphasis than they used to do, but the group is still more than the individual, life still more than the means of livelihood, and the simple standards of the countryside will for a long time carry themselves into the cities.

II

From this exploration of French Canadianism one figure is absent, the man of business. With very good reason. Except in minor roles, he is an inconspicuous figure. If one takes his *Manual of Canadian Securities* and looks at the serried ranks of Directors listed therein he will find only a corporal's guard of French names. The explanation is simple. Here is a society founded under a philosophy that admitted only a subordinate place to the man of business and his pursuits, that, even in his luxuriant fur-trading days, managed to keep him more or less in his place and that by historical accident was rather thoroughly purged of him. It is possible to find Catholic societies in which a degree of capitalism has prevailed, though it is to be suspected that in them Catholicism has been subject to very severe strains. Sometimes, as in nineteenth-century France, it has been shouldered aside. But in such a preserve of the church as French Canada, it would be vain to expect any striking development of native capitalism—except the special form of capitalism represented by ecclesiastical corporative organization. Both historically and today the weight of French-Canadian society is against capitalism. The values it seeks to conserve are quite other. The business man does not walk among the French as a god. Honours are paid not to the captains of industry but to the political,

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[6]Rural and Urban French Population of Quebec, 1871-1941

Year	*Rural*	*Urban*	*Total*	*Per cent rural*
1871	745,125	184,692	929,817	80.3
1881	806,960	266,860	1,073,820	
1891	No returns	.....	....	.....
1901	848,229	473,866	1,322,115	
1911	904,357	702,138	1,606,495	
1921	920,553	968,716	1,889,269	
1931	945,035	1,325,024	2,270,059	41.2
1941	1,107,380	1,587,652	2,695,032	41.7

Table from 1931 census, 1,755, table 35, and 1941, bulletin A-4. The total rural increase in Canada 1931-41 was 310,000 of which the French in Quebec contributed 162,000.

[7]In the last decade the French added to their population almost 70 per cent more people than those of British origin did to theirs, 553,000 as compared with 331,000.

and especially to the ecclesiastical figures. I can see no end to English-Canadian domination of the machinery of production in Quebec except the abandonment by the French of their attitude to life and their acceptance of ours—either that, which they will not deliberately make—or the invocation of the power of the state to take over English enterprise and thus a slipping back into a more or less efficient paternalistic socialism, in which the intellectuals at last have all the *postes* they want as public factory managers.

No; for this characteristic phenomenon of yesterday, the business man, we shall have to turn to the other side of the house, where he may be examined in riotous abundance. Our first contact with him is shortly after the Conquest when he comes rushing in on the heels of the military. He is in a hurry. He wants to get things done. He has ends to gain, an object in life. That object is one comprehended only remotely by the peasant. From the first the New World has released in men the passion of greed. Greed in itself as a human quality the peasant can understand well enough but not greed erected into a way of life and fortified not only with the majesty of the law but with the sanction of a religion. Yet no other group has so systematically set up acquisition as an object in itself and made it the centre of a cult as have the men of business of the English-speaking world.

In 1760, the new creed had not gone as far as it has since, and there continued to resist it the older elements in English life, feudalism in its eighteenth-century form of aristocracy and certain sections of the Church of England. It was in the fighting and governmental services that these elements found their strongest expression. It was therefore these that were to have the best relations with the conquered Catholics. The weight of the English thrust into the conquered territories was not, however, to consist in officials and the military, but in men representing the new way of life, which had already appropriated for itself a theology by which it could rationalize its conduct. This way of life became dominant in Canada and remains so.

The connection between Protestantism, especially Calvinism, and material achievement has been the subject of much investigation. Wherever Calvinism has prevailed, societies largely committed to the acquisitive way of life have arisen. The coincidence seems logical, for while the spirit of acquisition is as old as man, Calvinism subtly reinforces it. The burning question it presented to its adherents—and in altered terms still presents—was whether God had elected them unto salvation.[8] There was no infallible means of finding out but God might give a sign. And what more visible sign could the individual receive than that he should be prospered? But the sign would not come if one merely sat and waited for it. So the faithful set about each to his own individual duty, doing, as he believed, God's work. As someone has said, there is no more awesome sight than a churchful of Scotch Presbyterians upon their knees praying God to give them strength to do His will unto their fellow men, and then arising to go forth and do it! Calvinism created strong men, strong in their convictions, strong in their demands for elbow room to carry out their allotted tasks. But not men who were much concerned with their fellows. That was God's business. While the Jesuits were threading the wilderness to bring Christianity to the Indians, the New England Puritans were burning them alive in their own villages.[9]

In countless ways the Calvinistic type of Protestantism accentuated the motives of accomplishment and success. Everywhere it found its most congenial soil in urban areas, among the middle classes. In industry, it became the support of self-made men, men who "did not need the government to help them in *their* business," and in politics, it came to

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[8]Today this question is put in much terser and secular form: "Can I make good?" C. A. Beard, *The Rise of American Civilization*, makes the point that since about mid-nineteenth century, the ethic of success has dominated the older ethics: not "Is it just, is it right?" becomes the question, but "Can I succeed?" To fail in the presence of the group emerges as the unpardonable sin.

[9]A century later the *bourgeois* of the North West Company were zealously supporting the first Presbyterian Church in Montreal but that church showed a conspicuous absence of interest in the activities at the other end of the fur trade.

stand for *laissez-faire* and the policeman state. Its spirit reigned supreme in Victorian England, the spirit of drive, of providence and thrift, of smug success. How far it all was from the scriptural injunction to take no thought for the morrow!

Nowhere was the acquisitive ethic more at home than in the New World. There the field was open and nature invited exploitation. Hence the strong link between it, the Scotch or New Englanders, the staple trade, and the characteristic expression of the staple trade, the metropolitan-hinterland relationship. Traditions that might have held it in check were weak. Nearly everything sooner or later was bent in the one direction—the contempt of the older ideals and the intolerance that the new and the moving invariably manifests for the old and the static. The goal of material success passed over easily into success in terms of accomplishment or of power and in these forms afforded the driving energy that has mainly made America.

No one would assert that there have been no other aspects of life represented among the English-speaking population of Canada. Among our farmers many of the traits of peasant societies survive, and the antithesis between the country way of life and the urban has been almost as sharp at settlement come close to the French countryside itself in their conformity to older social patterns.[11] In the region of religious or cultural tradition there is the Anglican emphasis on service to the state and on the ideal of the gentleman; or the Scottish ideal of the learned man, the philosopher. Very prominent is humanitarianism, that powerful body of emotions, sentiments, beliefs, and actions, which has penetrated every nook and cranny of our Canadian life. It would be interesting to analyse the complex way in which these all twine around each other. But space does not permit. English-speaking Canada has fallen under these various traditions in about the same way as the United States, though at a retarded rate, for here there have been influences restraining their free play. For example, our continuing connection with Great Britain has provided some shelter for a class structure and a quasi-official church, the Church of England. For the first seventy-five years after the Conquest, this older English tradition —the "squire and parson" concept of society—made a strong fight of it with commercialism—as in its modern form it is doing again today, under the special circumstances of the war, with its strengthening of the forces of history. But it too became more or less assimilated to the dominant tone, as witness the business relationships of the Family Compact men, and left the field pretty clear for the exploitive and acquisitive attitudes, which had an almost unchecked run until a decade or two ago. There must be few English Canadians of middle life who were not brought up on the conviction that their business in life was to succeed, "to make good," "to get on," "to get to the top," "to amount to something."

Methodism, whose social gospel also opposed a certain counterweight to acquisition, split under its pressure. The industry and thrift inculcated by the creed brought worldly success to many of its followers, who trailed off into the acquisitive camp, taking with them the phraseology of simpler days and the shell of the old attitudes of brotherhood and often leaving awkward gaps between profession and performance. But the genius of Methodism continued to assert itself in characteristic social movements, temperance, social service, and so on. Eventually it found logical expression in a more or less formal political socialism: much of the drive in Canadian socialism comes out of Canadian Methodism and as it does battle with Canadian individualism, it carries forward the Christian ethic of support for the weak and the lowly against the strong and the established.

These are the two most significant traditions at work in our English-speaking community today: they represent its sharpest antithesis, and the future will witness a battle over which shall organize it. Neither one is now very firmly attached to its original

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[10]It had a large share in the Upper Canadian Rebellion of 1837, the Clear Grit party, and of course in the more recent agrarian movements, especially Alberta "Social Credit."

[11]See Dr. Enid Charles's article on Prince Edward Island and its population characteristics in *Canadian Journal of Economics and Political Science*, May, 1942.

religious base. The Methodist-humanitarian tradition satisfies itself with a social gospel and a social task: it resorts easily to perfectionism—to Utopianism, pacifism, a vague internationalism, and a "planned society." The Calvinist-individualist-success conception of life, stripped of its fine phrases about election unto salvation, initiative, individualism, being nothing more than mere selfishness, was the first to run beyond Christian bounds. Those who live in this area find themselves today confronting life either on the basis of a rather mechanical benevolence and simple good fellowship or face to face with a frank hedonism and a stark paganism.[11a]

The dynamics of acquisition have transformed the world but the societies dominated by them—of which our own is one—despite their brilliance, are hollow at the centre. For deep in the heart of this way of life there seems to be a denial of life. It sets up for itself a goal of goods, of plenty, of a "high standard of living," and here finding common ground with humanitarianism, surrounds itself with devices designed to smooth out life's ills, to make life easier, to prolong and save life. It secures food and shelter of an excellence never before attained. It increases the span of life, makes individuals healthier, stronger, taller, more alert. It decreases illness, physical disabilities, infant mortality, maternal mortality. And yet solicitous as it is for the individual's well-being, the societies it has created are slowly withering. Speaking of the disappearance of the English from the Eastern Townships, the authors of a recent book on Quebec say: "A peaceful victory, a grand victory, for today there are 300,000 French there as against less than 50,000 English. Note that the relations between them are excellent because our people have not returned the blows which their ancestors received. . . . 'The French are right to act in this way: it is better (instead of retaliation) to give the English splendid funerals'. . . . The majority of the English have become a population of old people . . . who having sold their property to the French, live in retirement in the villages. These villages present as it were 'the foretaste of a cemetery'."[12]

Many people become indignant because they would say the French are pushing the English out. I cannot see that the French are to blame. They are a virile people who can see no virtue in childlessness. If we have no instinct for group survival and choose the easy way out of comfort and race suicide, we have ourselves to blame.

Our two Canadian ways of life exemplify the antithesis that in general terms might be put somewhat as follows: The nearer what might be called the peasant-spiritual, or rural-natural, the primitive outlook on life, the stronger the hold on life, the greater the survival value of the group, the less considered the individual, the greater the complaisance in taking what life brings, good fortune or bad, good health or bad, sound limbs or crooked. In contrast, the more in the other current, acquisition, materialism, commercialism, urbanism, individualism, Calvinism—call it what you like—the greater the parsimony with life, the more concern for the individual, the more strenuous the efforts to keep him from blemish, to make perfect specimens, to patch up the defective, to prolong life, the less ability to create it. *The "high standard of living" seems to destroy life.* The one complex, in its extreme, leads to mere animalism, the other to extinction. Where is the happy medium and what philosophy will support it?

In Canada, the two outlooks have had marked geographical correlations. The urban-acquisitive complex has deepened in proportion to the longitude west. Prince Edward Island and Nova Scotia have been less affected by it than Ontario, Ontario than Manitoba, and Manitoba than British Columbia. Under the weight of the depression this tendency is not now so marked. The English in Manitoba and Saskatchewan alike are decreasing, and in Ontario and British Columbia they are kept afloat by immigration from other provinces. In Saskatchewan the pattern stands out with especial clearness: in the last ten years, those races close to the soil have held their own despite misfortune—Ukrainians, Germans, Hungarians, etc. But the commercial races—those who do not see

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[11a]The American divorce tradition, which is paganism, is a descendant of the individualism of American Puritanism.

[12]*Notre Milieu* (Montreal, 1942), 98.

life as existence but as opportunity—have gone sharply down in numbers, the English, the Syrians, the Jews, and the Chinese.

There is also a decided religious correlation. Believe it or not, you will have a considerably larger family if you are a Pentecostal than if you are a Presbyterian. The further one moves away from the simple, rural, pietistic groups, such as the Mennonites, among whom there were in 1931, 159 children under the age of five for every 1,000 persons, into the more sophisticated, urban, middle-class, acquisitive areas, which make large demands on life, the less is the likelihood that his group will replace itself in the next generation. At the extreme stand the Christian Scientists, just where one would expect them, with 45 children under five per 1,000, the perfect embodiment of prosperous middle-class dessication. When its characteristics are analysed every denomination falls exactly into the anticipated place.[13]

Correlations of group survival value may in fact be made by the bushel. There are positive correlations such as the rural life, pietistic or authoritarian religion, religious dogma, pioneer areas, old static areas, poverty, short life-expectancy, religious communism, communal segregation, lower class, labour in new industries, possibly aristocracy: and negative correlations such as urbanism, size of urban unit, individualism, altitude in the middle class, commercial attitudes, professional occupations, income, divorce, "feminism," the size and newness of automobile, exploitive economics, such as the mining and logging economy of British Columbia, suburbanized rural areas, humanitarianism, possibly agnosticism, intellectualism. In general it is the humble who have survival value. It is the meek who shall inherit the earth.

It is an ironic commentary upon history that that group which began with a return to life, with a triumphant affirmation of life, with a *"Welt-Bejahung,"* the Protestant, should now, with minor exceptions, have fallen into a denial of life, a fear of animal "robustiousness," while the other group, which persistently belittled this life and lived in the shadow of immortality, should be exhibiting in our day every evidence of that affirmation which Protestantism once made. Protestantism as a traditional way of life has got too far away from nature. Sophistication has been too much for it. Given our present attitude to life, we are probably fighting our last victorious war. If the test comes again in the future, we shall have too few young men to fend off the races such as the Japanese that ask less return from life but are more able to live. Our people are willing to make every effort to ensure by military means the immediate survival of their group but they seem not to have the slightest interest in what may happen to it a few years into the future. It may therefore be that their fate, too, is to pass under the harrow and from intimate contemplation of the arrogant superior, find for themselves the secret that the humble already know. *Deposuit magnifices de sedibus.* . . .

Does this mean that we shall have to choose between the way of life we have built up and our survival as a group? Shall we have to return to what most of us would feel to be a much poorer kind of civilization? I trust not, though if our civilization is to survive I am certain that some kind of compromise will have to be effected and many aspects of our present way of life greatly modified. Amid much that is good many of them are just idiotic. Everyone can amuse himself by compiling his own list of lunacies, but conspicuous among the major changes that will have to come is a modification of

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[13]Children 0-4 Years of Age per 1,000 of Total

Denomination	*Children 0-4 per 1,000 of total*	*Denomination*	*Children 0-4 per 1,000 of total*
Mennonites	159.3	United Church	87.5
Roman Catholics	125.5	Anglicans	85.5
Mormons	123.3	Presbyterians	80.5
Greek Orthodox	121.7	Salvation Army	75.5
Pentecostals	103.7	Jews	75.0
Lutherans	97.8	Christian Science	45.3
Baptists	90.5		

Table compiled from 1931 census, vol. III, p. 310.

the ethic of acquisition, the *appetitus divitiarum infinitus*, the unbridled indulgence of the acquisitive appetite, as Tawney puts it and the degenerate indulgence that surely accompanies it.

If our urban civilization were to fall through dry rot, through failure of man-power, hardly less ironical a fate would be in store for the non-acquisitive group, which is, in Canada, the French. Without the initiative of the English Protestant man of business, the present-day mechanical civilization could not have come into existence. Without it, the French would have remained a quiet rural people, probably not more than a quarter as numerous as they are now. If old William Price, or some other, had not opened up the Saguenay a century and a quarter ago, and if his successors had not built on to his achievements, instead of the lumber, the pulpwood, the water-power and the aluminum that now come out of that valley, there would have been a few farms on the shores of Lake St. John, a few small local saw-mills, and that would have been all. There would have been that many fewer opportunities for life. The industrial structure of Quebec rests on this initiative, which has provided work for the hundreds of thousands from the countryside who otherwise would have had to stay on the farm as bachelors and spinsters, or divide and subdivide the land in Malthusian misery. The question forces itself, "who has created the French race in America?" I make bold to say that the English industrialist has created about three-quarters of it.[14]

So the fate of the two peoples seems indissolubly linked. At present they complement each other, unhappily and acrimoniously. But may the day not come when understanding will be greater? May the English not learn a little tolerance, the French gain a little breadth? May the English, through suffering, perhaps, lose a little of their arrogance, the French a little of their touchy vanity? May the extreme commercialism of the English not be modified, the more obvious blatancies of their civilization overcome, their acquisitive ethic toned down? May the French not come forward and take their place in running a modern state, finding constructive ideas to contribute, getting a little further away from medievalism, from a philosophy that sacrifices nearly everything to survival value? May the deep fear which afflicts both sides—the fear of the French of losing their identity and the fear of the English of being outnumbered—not be dissipated in a common loyalty to a common country?

That day may come and it may not. Pressure from the outside world may bring it, though of that I am doubtful. The lessening numbers of the English may induce in them more of a live-and-let-live attitude. The penetrative qualities of North American civilization may bring French society closer to the continental norm. Most likely of all, it seems to me, the tensions and troubles of our times, which are not going to end with the peace, will some day burn out the grosser aspects of our English materialism, giving us a truer and deeper insight into life than what we have now, reforming our society in some such way as society was reshaped at the end of the middle ages and thereby establishing a new set of values in which both races can share. The two communities will never be one, there can be no question of a blood brotherhood, but sooner or later they will take up their respective weights, some kind of equilibrium will be reached, of that I am sure. We have not lived together for nearly two centuries merely to see the Canadian experiment fail. It will not fail. This country of high colours and violent contrasts will not fail. One of these days the two races, forgetting lesser allegiances, will unite in mutual loyalty to it, and build it into a structure of which our successors will be proud.

[14]Reckoning in the industrial French population of the United States.

Abstracts

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Medicine I

Abuse of Rest as a therapeutic Measure for Patients with Cardio-Vascular Disease

T. R. Harrison, M.D.
J.A.M.A., Aug. 19, 1944

In numerous European clinics, patients with congestive heart failure are often allowed to sit up in chairs and to walk about the ward. Among animals with experimental myocardial injury, extreme restriction of muscular activity is harmful and causes increased mortality, while the return to normal activity within a few days seems to exert no detectable injurious effects. There is no proof that bed rest continued for weeks after symptoms have disappeared is of value in the management of patients with congestive failure, angina pectoris or myocardial infarction. Available evidence points to the contrary. The concept developed during the past few decades that prolonged rest and complete abstinence from normal economic activity is the indispensable part of the proper management of the more serious forms of heart disease may be unsound. From the psychic standpoint, enforcement of a rigid regimen after the acute phase of the illness is past is definitely disadvantageous and it is common to observe rather severe manifestations of post-infarctional cardiac neurosis resulting from the physician's management of a heart attack.

The following tentative suggestions are offered for a plan of treatment: (1) patients with congestive heart failure should be allowed out of bed for several hours daily as soon as severe dyspnoea at rest has subsided. (2) Following myocardial infarction, recumbency should not be prescribed for a longer period than 2 to 3 weeks after the more acute and alarming symptoms have subsided. The recumbent position should not be enforced on patients who are more comfortable sitting.

R.M.B.

Medicine II

Some Harmful Effects of Recumbency in the Treatment of Heart Disease

S. A. Revine, M.D.
J.A.M.A., Sept. 9, 1944

Rest is a fundamental form of treatment in many diseases. Rest in bed, which has been fundamental in our treatment of heart failure, needs reconsideration in view of certain harmful effects and even hazards entailed. Bed rest decreases cardiac work by decreasing total bodily demands, slowing the heart rate, and maybe lowering the blood pressure. However, an effect of recumbency is to encourage venous return as oedema fluid leaves the tissue spaces and not infre-

quently the result is to increase the work of the right side of the heart and aggravate the pulmonary congestion. Dyspnoea may grow worse. In most cases, strict bed regimen generally results in improvement; some temporary ill effects are commonly produced but in most instances are counterbalanced or masked by the various other methods of treatment. The shift of fluid from the lower to the higher portions of the body in decompensated cardiac patients may be a dangerous handicap. Various other difficulties may follow prolonged bed rest in cardiac and non-cardiac patients—thrombo-phlebitis of the leg, pulmonary embolus, hypostatic pneumonia, urinary retention.

Although the fundamental principle that rest is beneficial for the heart remains undisputed, the recumbent position in some patients actually increases the work of the heart at certain stages of heart failure, although this effect is often only temporary. At times it is wise to treat patients with heart disease in a chair rather than in bed. All patients confined to bed for a considerable time should exercise their legs frequently during the day.

R.M.B.

Medicine III

Infectious Mononucleosis Simulating Brucellosis

Rubenstein and Shaw
The New England Journal of Medicine
July 27, 1944

The differential diagnosis of infectious mononucleosis and brucellosis (undulant fever) may give rise to considerable confusion although clinical and laboratory methods for the recognition of these infections are reasonably adequate. By means of the heterophile antibody reaction, the authors have shown that cases clinically suspected for brucellosis were actually cases of infectious mononucleosis. In both disease, fever of undetermined origin is usually the key note of the clinical course. To demonstrate how readily confusion may arise, case histories of each disease are presented.

A diagnosis of infectious mononucleosis is suggested by the presence of sore throat, tender enlarged lymph nodes and splenomegaly, and can be definitely confirmed by blood studies and a positive heterophile antibody sheep-cell agglutination reaction. The aetiological agent is probably a virus. The epidemiology of the disease is still obscure.

The diagnostic criteria for brucellosis are not nearly as well defined as for infectious mononucleosis. Clinically there is usually profuse sweating and varying degrees of splenic enlargement. A positive blood culture is pathognomonic, but is rarely obtained. A positive serologic agglutination test is not necessarily indicative of the disease since such a condition may arise from a present infection, previous exposure to Brucella organisms, or indeed in febrile diseases other than brucellosis among which infectious mononucleosis is not uncommon. In contrast to the ambiguity associated with its clinical manifestations, the epidemiology of brucellosis is well established and epidemiologic investigation may be of diagnostic assistance. The disease can be acquired by ingestion of infected dairy products, but in urban areas, except for cases contracted elsewhere, undulant fever is essentially an occupational disease of veterinarians and other persons having contact with infected animals, animal carcasses and animal products. Five cases are reported among machinists handling materials used in processing meat pro-

ducts, although these patients had no direct contact with animals or animal products.

R.M.B.

Medicine IV

Subacute Degeneration of the Brain in Pernicious Anaemia

Adams and Kubik
The New England Journal of Medicine
July 6, 1944

Pernicious anaemia is a disease characterized by certain changes in the blood and blood forming organs, in the gastro-intestinal tract and in the central nervous system. Not well known and indeed rarely mentioned in textbooks are the lesions in the cerebral white matter. Many clinical studies have been made of the psychiatric aspects of the disease, but the neuropathology has been neglected.

The patients often exhibit mental symptoms that vary from slight irritability and suspiciousness to marked confused psychosis. Patients with brain lesions have mental symptoms, but cerebral lesions are not always found in cases in which mental symptoms have been present.

The cerebral and spinal lesions are almost exactly alike and are unique, quite unlike those changes occurring in other disorders of the white matter. There is a diffuse, uneven degeneration of nerve fibres in the spinal cord and cerebral white matter, with relatively little proliferation of fibrous glia. In many cases there are spinal cord lesions without brain lesions, but, in all authentic reports of subacute degeneration of the brain, there have been spinal cord lesions. It appears that the order of involvement of the central nervous system is posterior columns, then lateral and anterior columns, and finally cerebral white matter. It seems reasonable to conclude that both subacute combined degeneration of the spinal cord and subacute degeneration of the brain represent an advanced stage in a specific process that is induced by a deficiency of certain substances necessary to the metabolism of myelinated nerve fibres.

R.M.B.

Medicine V

The Relation of Neurocirculatory Asthenia to Graves' Disease

E. Moschowitz, M.D., and
Solon S. Bernstein, M.D., New York
American Heart Journal, Vol. 28, No. 2

Because so many features of neurocirculatory asthenia (effort syndrome) closely resemble those of the constitutional or larval phase of Graves' disease, the authors believe the two are identical.

Neurocirculatory asthenia arises only in emotionally unstable individuals, showing a marked familial incidence of psychoneurotic states. There is nearly always a history of social maladjustment, introversion and fearfulness. This is closely paralleled by Graves' syndrome, and after a great calamity the incidence has been shown to increase. Thus both conditions are psychosomatic in nature.

The conventional symptoms of neurocirculatory asthenia, viz., breathlessness (especially on effort), palpitation, fatigue, dizziness, occasional precordial pain, sighing respiration, headache, dry mouth, occasional syncope, diarrhoea and usually anorexia, are not only symptoms often observed in early Graves' disease, but also in psychoneurotic states, being somewhat vague in character. They are also present after subtotal thyroidectomy for an individual with Graves' disease.

The physical signs of neurocirculatory asthenia also are similar to those of early

Graves' syndrome. Tachycardia is probably due more to emotion than to effort, since in war it occurs with anxiety, and it lessens with rest in each syndrome. Coldness and blueness of the hands are probably due to climatic conditions and may be present in larval Graves' syndrome.

Hyperpnoea may be present in either syndrome, but also in other emotional states and heart disorders. The coarseness of the hand tremor does not differentiate between the two since it varies as the adrenaline level of the blood.

Dermatographia and adrenaline blood levels are physiological responses which are varied by fear and anxiety. Dermatographia and asthenia are present in both syndromes.

Both syndromes may occur at any age but are rare in children, before the emotional faculties are fully developed. Both syndromes occur most commonly in the female, but in wartime, neurocirculatory asthenia appears to be commoner in the male because of more frequent reporting.

The authors believe neurocirculatory asthenia is an early stage of Graves' disease. The latter may be present with different groupings of symptoms and signs but finally an elevated B.M.R. of Graves' disease with the classical signs occurs. However, spontaneous remissions may occur before Graves' disease is diagnosed.

Enlarged thyroids may or may not be present, but as Graves' syndrome progresses, the enlargement increases. This is also apparently true of exophthalmos.

Transitions from neurocirculatory asthenia to Graves' syndrome and the reverse are illustrated by eleven cases.

R.K.M.

Obstetrics and Gynaecology

The Prognosis and Management of Premature Rupture of the Membranes

E. H. Bishop, M.D.
Amer. Jour. of Obstetrics and Gynaecology, July, 1944

This paper is based on 636 cases in which it is stated that the membranes definitely ruptured prematurely. The series is compared with 4,806 other deliveries occurring within the same period of time.

In over 75% of cases labour pains ensued within 12 hours of rupture of the membranes. Despite the varying latent periods between rupture and onset of pains, labour was appreciably shortened in all groups, multiparae and primiparae alike. In addition the incidence of forceps deliveries, breech extraction, version and extraction and Caesarian section was not increased.

Premature rupture did not lead to increased maternal morbidity. Actually the maternal morbidity was higher in patients whose pains began 1 hour after rupture of the membranes as compared with 63 patients with a latent period of 24 hours or more.

The incidence of still births and neonatal deaths was slightly lower.

Dr. Bishop states that the most important point in the management of these cases is to avoid "meddlesome obstetrics". No case of prolapse of the cord occurred in this series and it is believed that the presenting part must have descended to exert pressure on the fore-waters. The conclusion is that the old concept of "dry difficult labour" is no longer tenable.

I.D.M.

Paediatrics I

Stomatitis and Diarrhoea of Infants Caused by hitherto Unrecognized Virus

Buddington and Dodd
Journal of Paediatrics, Aug., 1944

In this article the authors describe an epidemic of stomatitis in infants characterized by fine vesicles and later desquamation on the tongue, gums, and mucous membrane. In 30% there was an accompanying mild diarrhoea. Organisms were recovered from the mouth and the stools of patients which produced characteristic lesions in the cornea of rabbits. This lesion consisted of cloudiness over the scarified cornea; swelling and injection of the conjunctivia, and pus at the inner canthus. It was noted that this lesion was definitely distinct from that caused by the herpes virus. The organisms were found to be filterable through a Berkefield V candle. They were successfully propagated from cornea to cornea through 30 generations. In one case diarrhoea was caused in a pair of rabbits by feeding them minced infected corneae, but this was not successfully repeated. Addition of convalescent serum to the suspension of organisms protected the rabbit so that the typical lesion did not appear. An immunity was developed in rabbits distinct from that of herpes.

Light and Hodes have recently reported the finding of a filterable agent from the stools of children with a more severe type of diarrhoea. Possible correlation of results awaits future work.

E.V.D.

Paediatrics II

Sulpha Drug Interference in Sugar Determinations

Todd, Dodson, Trainer, McKee
Dept. of Biochem., Univ. of Oregon
Arch. of Biochemistry, Vol. 4, July, 1944

The authors report interference in sugar determinations by certain alkaline copper methods. The interference is said to be due to the formation of a sulphanilamide-cuprous complex during the reduction process. The compound is decomposed in part by acid with the liberation of cuprous ion. For this reason the greatest discrepancies in sugar determinations are found in those methods employing the appearance of cuprous oxide as a criterion of the sugar content of the test solution; i.e., certain of the qualitative sugar methods.

Experiments were carried out using sulpha-levels that are found in the urine of patients on therapy with the drug. Qualitative tests give low readings, while some quantitative methods give slightly decreased readings with sulphanilamide. Sulphathiazole has little effect on qualitative tests, but causes large errors in certain quantitative tests. Other drugs offer little or no difference to low concentrations in the urine.

To avoid interference in urine sugar determinations the Somogyi method may be used, or the "Clinitest" method may be used on urine treated with norite and filtered.

E.V.D.

Preventive Medicine

Lumbosacral Roentgenograms of 450 Consecutive Applicants for Heavy Work

Breck and Hillsman, and Basom
Annals of Surgery, July, 1944, *120*: 88

The authors being unable to find reference in the literature to the variations which might be expected in so-called normal spinal anatomy, have made a study of roentgenograms of the lower back in a series of 450 consecutive applicants for work in a mine.

Pre-employment plates were 14 x 17 inch anteroposterior and lateral views, centering over the lumbosacral joint, but extending from the 11th thoracic vertebra to the coccyx.

A remarkable percentage of those examined had definite spinal pathology. Much that has been regarded previously as pathological, the authors have been led to conclude is normal or rather a variation of normal since 86% of the group had positive findings of some sort. 31% of the cases had significant pathology, this in a supposedly normal group!

The findings are tabulated and the significance of individual findings is discussed. Several X-ray photos illustrate the paper, but they are not good prints. As a result of their study, the authors feel that routine X-rays of the lower spine, on all applicants for heavy work, would effect a considerable saving in the matter of lost time and compensation payments.

H.K.

Surgery

Early Ambulation Following Section of the Anterior Abdominal Wall

Harry Nelson
Archives of Surg., 49: 1, July, 1944

The Abuse of Rest as a Therapeutic Measure in Surgery

J. H. Powers
J. Amer. Med. Assoc., 125: 1079
Aug. 19, 1944

The Abuse of Rest in Bed in Orthopedic Surgery

R. H. Ghormley
J. Amer. Med. Assoc., 125: 1085
Aug. 19, 1944

These three papers, appearing in two highly regarded journals, are merely convenient illustrations of a new trend in surgical thought. As one of them points out, orthodox teaching had always instilled in medical men the unquestioned faith in absolute rest as a therapeutic measure of prime importance. Only in recent years has there been a serious challenge to this point of view. The second and third papers named above are taken from a symposium on the abuse of rest in various fields of medicine and surgery. The views expressed and the conclusions arrived at in these three papers are so similar that they can be summarized together with ease.

Nelson and Powers present detailed analyses of series of cases which they each handled, totalling about 600 cases altogether. These patients, all of whom underwent operations which required opening of the anterior abdominal wall, were allowed and encouraged to walk, under their own power, within 72 hours (most of them in 24 hours) of operation. On walking to the bathroom, the majority of patients was able to empty their bladders without difficulty, and of the few requiring catheterization, practically none required it more than once. Subsequent convalescence was, in most cases, about half as long as the period required by

patients treated in the orthodox manner, was much more enjoyable from the point of view of both patients and nursing staff, and had a greatly reduced incidence of post-operative complications, such as pulmonary embolism, intestinal atony and distension, bladder retention, nausea and vomiting, loss of abdominal muscular tone, and mental depression. A considerable saving was effected, in time and money for the patients, and in available beds for the hospital.

Both authors agree on the use of non-absorbable cotton suture as their material of choice. Provided that certain contra-indications given by Nelson are respected, the patients are quite comfortable, and their incisions heal just as quickly, if not more quickly than those of patients treated in the customary manner. Wound complications were extremely few, although both series included patients over 80 years of age.

Orthopaedic surgeons, as explained by Ghormsby, face a different problem, because patients with fractures or other skeletal lesions severe enough to require hospitalization, usually are unable to walk about at any early date, because of the very site and nature of their lesions, and the methods of treatment used, e.g., traction of fractures. The pathological effects of prolonged bed rest are thoroughly appreciated, therefore, by orthopaedists, who have made many efforts in recent years to employ techniques which permit a minimum of interference with normal activity on the part of the patient.

It is possible that some future studies may reveal the policy of early post-operative ambulation to be faulty, but the arguments advanced in these papers seem now to be quite convincing. Even if they should eventually be shown to be in error, these papers are well worth reading, because they emphasize the importance of keeping an open mind on subjects which tend to be taught more or less dogmatically through the years.

H.K.

Urology

The Endocrine Treatment of Cancers of the Prostate Gland

Dean, Woodard, and Twombly
Surgery, Vol. 16, No. 2, Aug., 1944

The authors report the results of treatment of 60 patients suffering from prostatic carcinoma, 31 by orchidectomy and 29 by stilboestrol. Orchidectemy brings about relief of pain in from 24 to 48 hours and causes return of appetite, increase in weight, and regression of metastases in the soft tissues, including the lungs. Bony metastases are thought to be improved in some cases. The primary growth is seldom affected. A few patients continue on a downhill course, but most are well for about 8 months on the average and then have a relapse.

The response to stilboestrol therapy is slower than that following castration, but the result seems to be as good after a few weeks of treatment. This substance has a greater effect on the primary growth than does castration. Some of these patients have a relapse after about seven months, but those who do not have a relapse at this time remain well for two years on the average.

A relapse following stilboestrol therapy does not benefit from castration, and similarly stilboestrol is of no avail when a relapse occurs following castration.

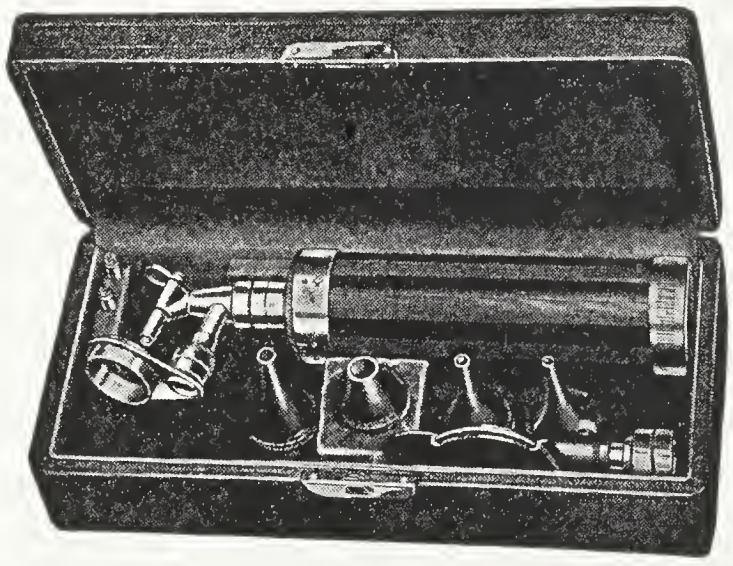
Serum *acid* phosphatase levels that were normal before treatment showed change after treatment. Those patients with increased acid phosphatase showed decreases (though not down to the normal level)

in all cases except two who were not benefitted by the treatment and soon died.

Of the patients with elevated serum *alkaline* phosphatase levels, nearly all had bony metastases. Of these cases, between 65% and 75% showed a further rise after treatment. Several explanations of this phenomenon are suggested, but which is correct has not yet been determined.

The changes in the urinary output of androgens and oestrogens following castration and following stilboestrol therapy lead the authors to believe that the mechanisms by which these two forms of therapy cause regression of the disease are quite different, although what these mechanisms are is not yet clear.

K.F.C.



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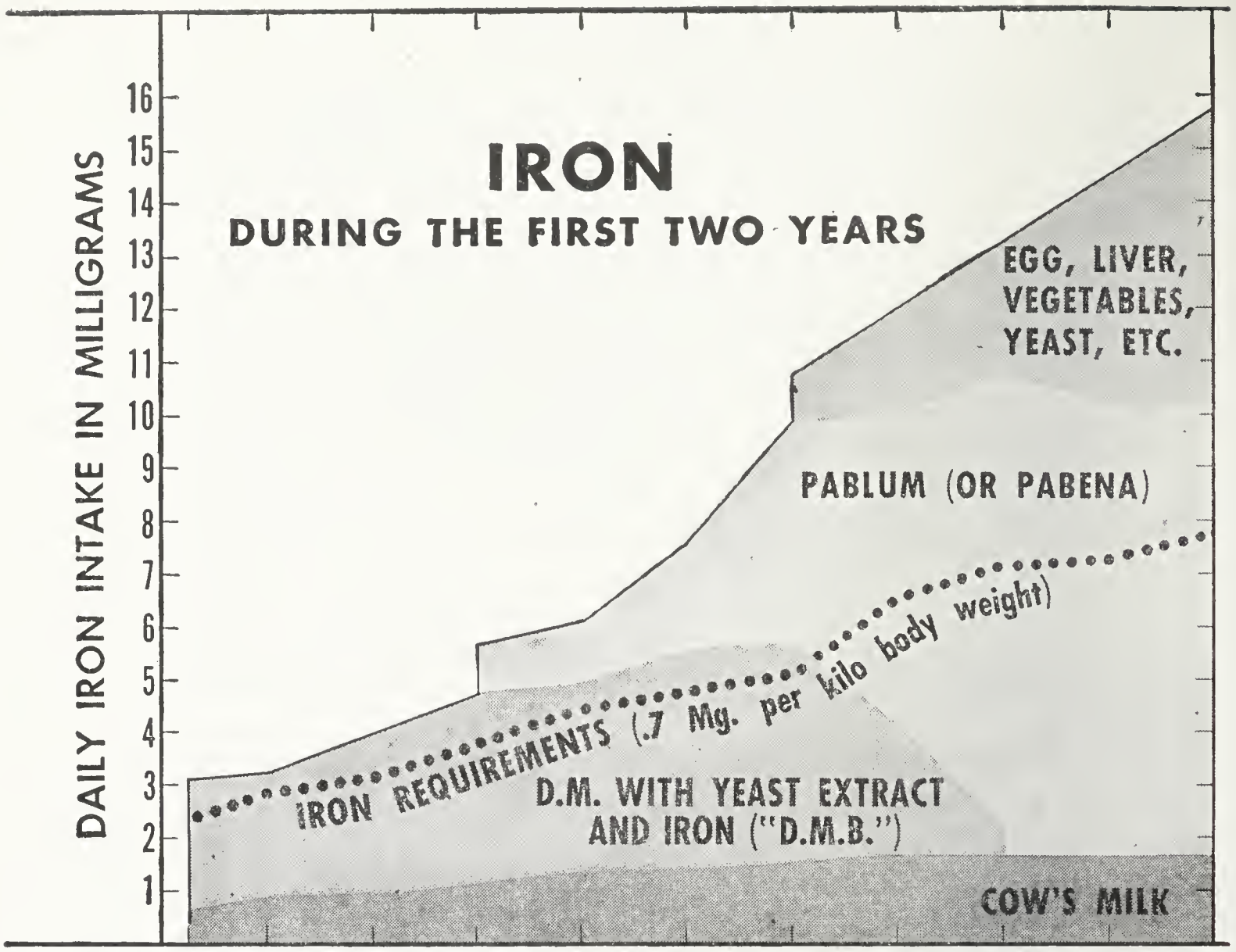

AGE, Mos.	¼	1	2	3	4	5	6	9	12	18	24
WEIGHT, Lbs.	7	9	10	12	14	15	16	19	22	23	25
MILK, Oz.	10	16	18	21	24	26	28	32	32	32	32
"D.M.B.," Oz.	1	1	1¼	1½	1½	1¾	1¾	1	¼	0	0
PABLUM, Oz.	0	0	0	⅛	¼	¼	½	¾	1	1	1

IRON DURING THE FIRST TWO YEARS

During foetal life iron accumulates (in the form of haemoglobin) in the infant's body. After birth the haemoglobin frequently drops to 50% by the third month, especially in prematures. Neither breast milk nor cow's milk is capable of offsetting this loss, as they are deficient in iron. This chart shows that when the carbohydrate and cereal supplements contain iron, a sizeable margin of safety over the requirements can be maintained, not only during the important first six months, but throughout the first two years of life.

More iron than the calculated requirement is needed because some iron is not utilized. In rapidly growing, or poorly nourished infants, and in the presence of infection, the need for iron may be even greater than is indicated in this chart for normal infants.

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